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May 30, 2003

Mr. Steve Buechi, Painesville Project Manager
USACE- Buffalo Office (CELRB-PE-EE)
1776 Niagara Street
Buffalo, NY 14207-3199

**RE: Final Remedial Investigation/Feasibility Study (RI/FS) Report,
Painesville FUSRAP Site, Painesville, Ohio
Contract # : DAHA90-94-D-0007**

Dear Mr. Buechi:

Under separate cover you should have received twenty copies of the Draft Focused Remedial Investigation/Feasibility Study (RI/FS) Report associated with the Painesville FUSRAP Site. This report consists of the Remedial Investigation (RI), RI Figures, RI Tables, Feasibility Study (FS), FS Figures and a CD ROM of the Appendices A through J. Also, enclosed is a CD ROM containing an electronic version of the entire RI/FS Report.

If you have any questions regarding this document, please call us.

Sincerely,

Science Applications International Corporation

Robert W. Tucker for.

Brad Richardson
Project Manager, Painesville FUSRAP Site

enclosures: Public Review Draft Focused Remedial Investigation/Feasibility Study (RI/FS) Report (3);
RI/FS on CD ROM

cc: Jeff Dick, Program Manager (1)
Bob Tucker, Technical Manager (1)
Project File (CFR) (1)

RI Text

FINAL

REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT

PAINESVILLE FUSRAP SITE
PAINESVILLE, OHIO

Prepared for:
U.S. Army Corps of Engineers
Buffalo District

Prepared by:
Science Applications International Corporation
4900 Blazer Parkway
Dublin, Ohio 43017

Contract: DAHA90-94-D-0007

May 2003

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF APPENDICES

NOTE: Appendices are found on the CD in the pocket on the back cover of the document.

ACRONYMS, ABBREVIATIONS, AND SYMBOLS

Ac-227	Actinium-227
AEC	Atomic Energy Commission
ALARA	As Low as Reasonably Achievable
ANL	Argonne National Laboratory
ARARs	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
BAF	Bioaccumulation Factor
BAFi	Bioaccumulation Factor for Invertebrates
BAFmamm	Bioaccumulation Factor for Mammals
bgs	below ground surface
BDE	Butadiene
BNI	Bechtel National Incorporated
BRA	Baseline Risk Assessment
CEC	Cation Exchange Capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm/sec	centimeters per second
cm	centimeters
CoC	chain of custody
COCs	Constituents of Concern
COPC	Constituents of Potential Concern
cpm	counts per minute
CQC	Chemical Quality Control
CSF	Cancer Slope Factor
CT	Central Tendency
cu. yds.	cubic yards
DAC	Derived Air Concentration
DMC	Diamond Magnesium Company
DOC	United States Department of Commerce
DOE	Department of Energy
DQA	Data Quality Assessment
DQI	Data Quality Indicator
DQO	Data Quality Objective
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
EPC	Exposure Point Concentration
EU	Exposure Unit
F	Fahrenheit
FCR	Field Change Request
FIDLER	Field Instrument for Detecting Low Energy Radiation
FP&E	Fairport, Painesville and Eastern Railroad
FR	Federal Record
FS	Feasibility Study
ft	feet
FUSRAP	Formerly Utilized Sites Remedial Action Program
GPS	Global Positioning System
GSA	General Services Administration
Ha	hectares

ACRONYMS, ABBREVIATIONS, AND SYMBOLS(Continued)

HCl	Hydrochloric Acid
HEAST	Health Effects Assessment Summary Table
HHRA	Human Health Risk Assessment
HTRW	Hazardous, Toxic or Radioactive Waste
IA	Investigative Areas
IDW	Investigative Derived Waste
ILCR	Incremental Lifetime Cancer Risk
Kcpm	thousands of counts per minute
Kd	distribution corfficient
km	kilometers
LCC	Lonza Chemical Company
LCPC	Lake County Planning Commission
LOSA	Lake Ontario Storage Area
m	meter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCL	Maximum Concentration Level
MDA	Minimum Detectable Activity
MDI/TDI	Methylene Diparaphenyline Isocyanate/Toluene Diisocyanate
MED/AEC	Manhattan Engineering District/Atomic Energy Commission
mg/kg-d	milligram per kilogram-day
mi	mile
µCi/ml	micro curie per milliliter
µrem/hr	microRem per hour
mrem	milliRem
MS/MSD	matrix spike/matrix spike duplicate
NaI	Sodium Iodide
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
ODH	Ohio Department of Health
Ohio EPA	Ohio Environmental Protection Agency
ORNL	Oak Ridge National Laboratory
OSWER	Office of Solid Waste and Emergency Response (USEPA)
Pa-231	Protactinium-231
Pb-210	Lead-210
pCi/g	picocuries per gram
PGDP	Paducah Gaseous Diffusion Plant
PID	Photoionization Detector
PPE	Personal Protective Equipment
PRG	Preliminary Remediation Goal
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RA	Remedial Action
Ra-226	Radium-226
Ra-228	Radium-228
RAGS	Risk Assessment Guidance for Superfund
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act

ACRONYMS, ABBREVIATIONS, AND SYMBOLS(Continued)

RESRAD	Residual Radiation
RfD	Reference Dose Factor
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROPC	Radionuclides of Potential Concern
RPM	Radiation Protection Manager
RR	Railroad
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SERA	Screening Ecological Risk Assessment
SESOIL	Seasonal Soil Compartment Model
SOR	Sum of Ratios
SVOC	Semivolatile Organic Compound
SOW	Scope of Work
TBC	To Be Considered
TCL/TAL	Target Compound List/Target Analyte List
Th-228	Thorium-228
Th-230	Thorium 230
Th-232	Thorium-232
TIC	Tentatively Identified Compound
TPP	Technical Project Planning
U-235	Uranium-235
U-238	Uranium-238
UCC	Uniroyal Chemical Company
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
UCL	Upper Confidence Level
UTL	Upper Tolerance Limit
VOC	Volatile Organic Compound
yd^3	cubic yards

EXECUTIVE SUMMARY

The Painesville Formerly Utilized Site Remedial Action Program (FUSRAP) Site is located at 720 Fairport-Nursery Road in Painesville, Ohio, approximately 35.4 kilometers (km) [22 miles (mi)] northeast of Cleveland. The Painesville FUSRAP Site is approximately 21 hectares (52 acres) in size. The western two-thirds of the site is owned and operated by Crompton Company, while the eastern third of the site is owned and operated by Twin River Technology. The Painesville FUSRAP Site is bounded on the north by the Fairport, Painesville, and Eastern (FP&E) Railroad, on the south and west by Fairport Nursery Road, and on the east by Hardy Road. The site contained as many as 35 buildings and structures. With the exception of the administrative building all the buildings on the Crompton portion of the site have been demolished down to ground level. The foundations remain in place.

In the early 1940s, the Defense Plant Corporation constructed a magnesium production facility in Painesville, Ohio, on property owned by the Diamond Magnesium Company (DMC). In support of the war effort and later government operations, DMC operated this facility from the early 1940s to the early 1960s for the General Services Administration (GSA). At some point during the operations ownership was transferred to the government (DOE 1992a). The plant was sold by GSA in two parcels in 1963 to Uniroyal Chemical Company [UCC] (western portion) and Lonza Chemical Company [LCC] (eastern portion).

There is no known history of processing or production of radioactive materials at the Painesville FUSRAP Site. The radioactivity present at the site resulted from the use of scrap ferrous metal to scrub chlorine gas released during the magnesium production process. The GSA shipped such scrap metal (approximately 1,650 tons) from the Atomic Energy Commission's (AEC's) inventories at the Lake Ontario Storage Area (LOSA) in Niagara Falls, New York in the early 1950's. These steel drums had been used to store residues from the processing of pitchblende ores. Since elevated concentrations of Thorium-230 (Th-230) have been identified at the site, it is suspected that some of these drums contained process residues from the Mallinkrodt St. Louis facility (now a FUSRAP site).

Because the constituents of concern (COCs) in the scrap metal were related to Manhattan Engineering District (MED)/AEC activities, a preliminary and limited radiological survey was conducted by Oak Ridge National Laboratory (ORNL) in 1988. The findings indicated the principal radiological COCs were uranium-238 (U-238), radium-226 (Ra-226), thorium-230 (Th-230) and their naturally-occurring decay products.

ORNL returned to the site in September 1990 to conduct a more thorough survey. The survey results (ORNL 1991) indicated elevated concentrations of radionuclides were found in both surface and subsurface soil in excess of Department of Energy (DOE) guidelines for release of a property without radiological restrictions. Based on these initial surveys, the site was designated by DOE as a FUSRAP site for further evaluation and remedial implementation, as appropriate (Williams 1992).

In 1996, Bechtel National, Incorporated (BNI), Science Applications International Corporation (SAIC) and Argonne National Laboratory (ANL), under contract to DOE, performed a detailed investigation of the Painesville FUSRAP Site area. The results of this study are documented in the Characterization Report (USACE 1998a) and the Engineering Evaluation/Cost Analysis (EE/CA) performed for the Painesville Site (USACE 1998b). Based on the recommendations of the EE/CA, (USACE 1998b) the United States Army Corps of Engineers (USACE) conducted a Removal Action to remove soils containing residual radionuclides. During the 1998 Removal Action, approximately 1,326 yd^3 of contaminated soil was excavated and removed from the west side of the property around the butadiene (BDE) tank. During the excavation activities, however, it was discovered that more contaminated material was present than was originally estimated from previous investigations. The results of limited environmental sampling and field instrument surveys performed during the 1998 Removal Action indicated the foundation backfill around several structures and fill along recently installed utilities contained potentially contaminated materials. In addition, there was also some indication that the lateral extent of the contamination was slightly larger than originally mapped. Uncertainty surrounding the extent of contaminated soils resulted in the excavation effort being halted before remediation of the site was completed. An additional follow-up investigation was designed to further delineate the extent of known radiological contamination at the site and to determine if contamination exists in previously inaccessible areas that are now available due to closure of the current tenant's (Uniroyal) facility. The USACE developed a detailed scope of work for the elements of this investigation in a Focused Remedial Investigation/Feasibility Study (RI/FS).

The Focused RI/FS was conducted by SAIC in September 2000 and was concerned primarily with residual radionuclides in soil. The RI/FS consisted of additional field sampling and baseline human health and ecological risk assessments. Field activities included the collection of surface and subsurface soil samples, as well as a Gamma Walkover Survey. The results of these activities were used to identify potential source areas, determine if vertical zones within the shallow soils have been impacted by past operations, and delineate the extent of impacted areas. The risk assessment provided a basis for determining the concentrations of radiological constituents that can remain on site and still be adequately protective of human health and the environment. The human health and ecological risks were used in conjunction with applicable or relevant and appropriate requirements (ARARs) and other regulations "to be considered" (TBC) in order to determine the need for further remedial action at the Painesville site. Two ARARs are proposed in this RI/FS: the standards set forth in 10 Code of Federal Regulations (CFR) 20 Subpart E establish a dose rate of 25 millirem (mrem)/year as a cleanup criterion and Ohio Administrative Code (OAC) Chapter 3701-1-38, General Radiation Protection Standards for Sources of Radiation, which reiterates the 25 mrem/year standard also requires that in order for a licensed facility to be decommissioned, it must meet the criteria for unrestricted use for the critical group or a license must remain in place. Ohio has consistently defined that critical group as a subsistence farmer. It is from the 25 mrem/year limit that contaminant area and volume calculations are derived.

Several areas of residual radionuclide contamination have been delineated based on results of the field sampling effort. Radionuclides detected above background levels in soil samples from the various areas include Ra-226, Th-230, and U-238. The most significantly impacted areas include Areas A, C, and B. The estimated volume of material that exceeds potential ARARs in these areas is 2040 cubic yards (yd^3), 1100 yd^3, and 470 yd^3, respectively. The estimated volume of material exceeding potential ARARs in Areas D, G, and I individually range from 60 yd^3 to 310 yd^3. Due to the recent demolition of the buildings on site, there was some concern over the migration of MED/AEC contaminants from known contaminated areas to clean areas. The site owner and their demolition contractors were fully informed of the presence of MED/AEC related contaminants prior to conducting demolition activities near impacted areas. In addition, all known areas of contamination on the site were roped off to mitigate cross-contamination to non-impacted areas by site demolition activities

Radionuclides were detected above background levels at the other features investigated, but usually at much lower levels. Detections above background levels at depths greater than a few feet were encountered in Areas that had post-1950s construction, such as the pump houses and BDE tank berm. Contamination outside of this area is generally confined to the surface soils. Although most of the buildings on the Painesville FUSRAP Site pre-date the presence of MED/AEC contaminated materials, several do not. It was decided that the fill used around the post-1950 structures be investigated to determine if contaminated soils were used as structural backfill. Therefore, the foundation fill around Buildings 413, 414, 415, and the Methylene Diparaphenyline Isocyanate/Toluene Diisocyanate (MDI/TDI) Transfer Station was investigated.

The human health risk assessment identified eight radiological COCs for the Painesville site soils. These include lead-210 (Pb-210), Ra-226, radium-228 (Ra-228), thorium-228 (Th-228), Th-230, thorium-232 (Th-232), uranium-235 (U-235) and U-238. Estimates of risk generated by the human health risk assessment were compared to the acceptable risk range of 10^{-4} to 10^{-6} cited in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Both the industrial worker and the hypothetical site subsistence farmer scenarios produced risk estimates in excess of 10^{-4}. The screening ecological risk assessment (ERA) was performed for earthworms, small terrestrial mammals, and birds exposed to radionuclides of potential concern in eight exposure units at the Painesville site. Screening benchmarks are set at a point where impacts to environmental receptors are expected to become evident. No radionuclide of potential concern exposure point concentration exceeded its screening benchmark at any exposure unit therefore no AEC related ecological COCs were determined. Ra-226 contributed the most to daily dose, but all Ra-226 concentrations were below the screening benchmark, and thus below one-tenth of the daily allowable dose. It is concluded that exposure of terrestrial biota to radiation doses from AEC related radionuclides at all exposure units is unlikely to cause harm.

1.0 INTRODUCTION

1.1 PURPOSE OF THE FOCUSED REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT

The Painesville Formerly Utilized Site Remedial Action Program (FUSRAP) Site was the subject of a Characterization Report and an Engineering Evaluation/Cost Analysis (EE/CA) issued in 1998. Based on that information a Removal Action was performed in 1998. The contractor working the excavation found more apparently contaminated material present than had been expected from the earlier investigation. This information and the closing of the Uniroyal facility altered the site conditions and warranted a Focused Remedial Investigation/Feasibility Study (RI/FS). The RI/FS is focused because the authorization for remedial action at the site only authorizes remediation of radionuclides that were the responsibility of the Manhattan Engineer District/ Atomic Energy Comission (MED/AEC). From the outset, FUSRAP authorization for remedial activities at the Painesville site was limited to radiological contamination associated with MED/AEC activities. This contamination includes radionuclides from the uranium, thorium and actium decay series. MED/AEC activities were not performed at the Painesville site. Radiological contamination detected at the site came from MED/AEC scrap materials brought to the site. This RI/FS is intended to complete the characterization of the radiological constituents of the Painesville FUSRAP Site and to present and evaluate alternatives for remediation.

The users of this data are: the U.S. Army Corps of Engineers (USACE), who will use the report to decide on the action(s) necessary to return the site to conditions consistent with the health and safety of users given the intended land use, the Ohio Environmental Protection Agency (Ohio EPA) and the Ohio Department of Health (ODH), who will evaluate the data to ensure that public health and safety are protected, and the public and other stakeholders, will have an opportunity to comment on this report and planned actions.

1.2 REMEDIAL INVESTIGATION OVERVIEW AND SCOPE

On October 10 and 11, 1988, Oak Ridge National Laboratory (ORNL) performed a preliminary site evaluation of the Painesville FUSRAP Site. This evaluation included a number of radiological surveys and radiological analyses of soil samples. The areas that were evaluated included the property west of the buildings from the west parking area to the fence south of the Fairport, Painesville and Eastern (FP&E) railroad tracks. During the survey, information was obtained concerning other portions of the property that would need to be addressed as part of future efforts (ORNL 1990).

ORNL returned to the site in September 1990 to examine the property to the east adjacent to the railroad tracks, owned by Lonza, and to investigate "stones" that showed elevated gamma readings during the 1988 survey. The survey results (ORNL 1991) indicated that elevated concentrations of radionuclides were found in surface and subsurface soil of both properties in excess of 40 CFR 192 guidelines. The major contaminants were Radium-226 (Ra-226) and Thorium-230 (Th-230).

In 1996, Bechtel National Incorporated (BNI), Science Applications International Corporation (SAIC) and Argonne National Laboratory (ANL), under contract to Department of Energy (DOE), performed a detailed investigation of the Painesville FUSRAP Site. This investigation included ambient air sampling, external gamma rate exposure measurements, building radiological surveys, gamma walkover surveys, groundwater sampling, surface geophysical surveys, surface water sampling, sediment sampling, ecological sampling, and soil sampling. The results of this study are documented in the Characterization Report for the Painesville FUSRAP Site (USACE 1998a).

In 1998, the USACE conducted a Removal Action following an EE/CA (USACE 1998b). During the Removal Action approximately 1,326 cubic yards (yd^3) were removed from the area immediately around the Butadiene tank (west side of the property). Samples were taken in 13 locations during the Removal Action. Post-excavation sampling was not performed at this time although the area was scanned using field instruments.

This work indicated the foundation backfill around several structures and fill along recently installed utilities contained potential MED/AEC related contamination. There was also some indication based on field screening that the lateral extent of the contamination was slightly larger than originally mapped. Due to weather constraints the remedial action was halted before all contaminated material had been removed.

According to the SOW, (USACE 1999a) the September 2000 field program was designed to: further delineate the extent of known radiological contamination at the site and to determine if soil contamination exists in previously inaccessible areas that are now accessible due to Uniroyal's closure. The work done to accomplish this included Gamma Walkover Surveys and soil sampling. The Sampling and Analysis Plan (SAP)(SAIC 2000b) details the activities designed to accomplish the objectives indicated in the SOW. The Quality Assurance Project Plan (QAPP) (SAIC 2000b) details the procedures to insure the quality of the data and the Site Safety and Health Plan (SAIC 2000b) details the activities to be undertaken to insure the safety and health of the workers.

1.3 REPORT ORGANIZATION

This report is organized in the following manner: Section 1 includes the purpose, overview and scope of the Remedial Investigation (RI), Section 2 includes the site description, history, physiography, ecology, meteorology, geology and hydrology, and a description of land use and population in the surrounding community. It also contains a brief review of the previous investigations. Section 3 includes a description of the activities conducted during the fall 2000 field program. Section 4 contains an area by area description of the nature and extent of contamination, along with major figures and summary tables showing the extent of contamination. Section 5 focuses on the fate and transport of MED/AEC related constituents. Section 6 contains both the human health risk assessment and the ecological risk assessment. Section 7 presents conclusions and a summary of findings.

2.0 SITE BACKGROUND

The Painesville FUSRAP Site is located at 720 Fairport-Nursery Road in Painesville, Ohio, approximately 35.4 kilometers (km) [22 miles (mi)] northeast of Cleveland. Figure 2.1 shows the site's proximity to the surrounding area. The site is located at approximately 41 degrees, 45 minutes north latitude, 81 degrees, 15 minutes east longitude, and is shown on the Perry Quadrangle, Ohio-Lake County, 7.5 minute series, United States Geological Survey (USGS) map.

The Painesville FUSRAP Site is bounded on the north by the FP&E Railroad, on the south and west by Fairport Nursery Road, and on the east by Hardy Road. Painesville Township Park lies north of the site, while industrial properties are located on the other sides of the site. The Diamond Alkali Waste Lake, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site is located to the south of the site, and residential properties are to the northeast. An abandoned industrial site is located to the northwest. The Grand River is located approximately 0.2 kilometers (km) [0.1 miles (mi)] southwest of Fairport Nursery Road, and flows in a northwesterly direction towards Lake Erie. Figure 2.2 shows the Painesville FUSRAP Site and adjoining properties.

The site contained as many as 35 buildings and structures. Except for one, the buildings on the Uniroyal portion of the site have been demolished. Available information on the construction and function of most of these buildings is limited. Information on the original site boundary is in Figure 2.3 and information on the former locations of buildings is illustrated in Figure 2.4.

2.1 SITE DESCRIPTION

2.1.1 Topography

The Painesville FUSRAP Site is approximately 21 hectares (ha) (52 acres) in size and has very little topographic relief. The maximum elevation change across the site is less than 3 meters (m) [10 feet (10 ft)]. The western two-thirds of the site is owned and operated by Crompton Company [Formerly Uniroyal Chemical Company, (UCC)], while the eastern third of the site is owned and operated by Twin Rivers Technologies [formerly Lonza Chemical Company, (LLC)].

The west side of the UCC property is comprised primarily of open grass fields, a waste pond, an above-ground BDE tank, and several railroad spurs. The ground surface on the east side of the UCC property is primarily covered with asphalt. It formerly was covered by process buildings, warehouses, office buildings, a chemical transfer facility, several above-ground storage tanks, building rubble piles, and a railroad spur (see Figure 2.3). This property has three roads running in a north-south direction, and three roads running east-west. The main entrance is located at the south end of the property just east of the main office building. A second entrance is located in the north-west corner of the UCC facility.

The LCC property is covered with concrete except for the south and southeast portions of the site that are either covered by grass or have exposed soil. Other surface features include above-ground processing tanks on the far west side of the property, three railroad spurs, and a waste pond located on the east side of the property. The only entrance is located in the northeast corner of the property. Figure 2.3 presents the layout of the LCC portion of the site.

2.1.2 Geology

The geology of the Painesville FUSRAP Site is relatively simple, a blanket of till with some localized fill overlies bedrock. Up to 20 ft of fill and at least another 20 ft of till over lie bedrock. Details of the surficial and bedrock geology are presented in the following paragraphs.

2.1.2.1 Surficial Geology and Soils

The Painesville FUSRAP Site lies within the Eastern Lake Section of the Central Lowland Province, commonly referred to as the Lake Plain. The Lake Plain is a narrow strip of land, three to five miles wide, that parallels the shoreline of Lake Erie. This section consists of sedimentary rock sequences overlain by glacial deposits. The land surface slopes very gently downward to the present lake bluff (White 1980).

The soils underlying the site, as described below, consist of a layer of disturbed/fill material overlying a thick deposit of fine-grained glacial till. Although the fill layer contains abundant man-made materials and debris, the primary matrix of the fill consists of disturbed fine-grained till, presumably generated locally. In the large fill area extending from the western side of UCC's BDE tank to UCC's northwestern property boundary, there are isolated pockets, or layers, containing undisturbed till.

The Ashtabula Till, a nonlithified till deposited in the late Woodfordian Age of the Wisconsinan glaciation during the Pleistocene Epoch, lies disconformably above the Chagrin Shale. Characteristically, the till is a dense, weakly jointed, compact unit with a gray color on fresh surfaces and a brown color where weathered (Schmidt 1988). Weakly jointed till has a partially developed set of fractures similar to jointing found in some types of bedrock. The till was also observed to have a high clay and silt content with a few sand- and gravel-sized, dark gray, shale fragments.

Located above the Ashtabula Till at the site is a layer of disturbed/fill material. Borings revealed a fill thickness ranging from 0.0 to 6.2 m (0.0 to 20.5 ft). This fill unit was found to be thickest in the western/northwestern part of the site over a large area that extends from the western side of the UCC BDE tank to the northwestern property boundary. Surface geophysical surveys conducted at the site also confirmed the location and approximate/relative depth of the fill. The fill consists of a wide variety of material: disturbed native till, black coal slag and fly ash, white granular polyvinyl chloride, red bricks, concrete, sand and gravel, plastic, cloth, glass, and metal.

2.1.2.2 Bedrock Geology

The uppermost bedrock unit underlying the site is the Chagrin Shale Formation (Schmidt 1988). The Chagrin Shale is a member of the Late Devonian-aged Ohio Shale Formation. In this area the Chagrin Shale is approximately 300m (1000 ft.) thick (USACE 1998a). Bedrock was not encountered in any of the boreholes, drilled to a maximum depth of 12 m (40 ft) during characterization; however, shale fragments were observed in the overlying soil. These shale fragments are a result of glacial erosion and presumably belong to the Chagrin Shale Formation.

2.1.3 Hydrogeology

Elevation data collected from shallow piezometers and temporary monitoring wells suggest that perched groundwater occurs near the surface across much of the site, but is discontinuous and shallow. It appears that perched groundwater is pooling in topographic depressions on top of the natural clay formation. The results from drilling activities determined that the regional groundwater table is at a depth greater than 12 m (40 ft) below the ground surface. Observations made during drilling of the deep borings in 1996 indicated that the materials immediately above the regional groundwater table were unsaturated over most of their vertical profile.

The perched groundwater observed in the piezometers and temporary monitoring wells is very cloudy to turbid in nature and does not represent a potential drinking water source. This determination was made jointly between DOE and the Ohio EPA based on the following information obtained during the characterization effort:

- Perched groundwater at the site is typically encountered within the first few feet below ground surface and is perched on top of natural formation soil, which has a high clay content.
- The perched groundwater is discontinuous across the site.
- The thickness of the saturation lens is, in most cases, less than 0.3 m (1 ft).
- Temporary wells installed during characterization activities produced water at very low rates (less than 1 gallon per minute).

Water resources of the Painesville area are generally confined to surface water of Lake Erie and the Grand River (Stout et al. 1943). According to Aller and Ballou (1991), groundwater yields from the glacial till deposits in Lake County are variable but typically low. The perched water sits on the till which is connected to the bedrock, however flow through the till is very slow and as mentioned below the bedrock is also not a good aquifer. Recent information supplied by Ohio EPA indicates that there are no domestic users of groundwater in the vicinity of the site.

Slug tests performed within each of the temporary monitoring wells revealed an approximate hydraulic conductivity between 8.5×10^{-5} and 6.5×10^{-6} centimeter/second (cm/sec) for the till unit. Both values are characteristic of till as listed by Freeze and Cherry (1979). The hydraulic conductivity for the overlying fill was computed as 2.3×10^{-3} cm/sec which is more representative of silt and sand deposits (Freeze and Cherry 1979). It should be noted, however, that due to the heterogeneous nature of the fill, the hydraulic conductivity values could vary by several orders of magnitude.

Groundwater yields from the bedrock are usually only adequate for domestic use. Stout et al. (1943) report that the Chagrin Formation underlying the Painesville area yields little or no water. Sulfur water or brine is often encountered during deep drilling operations. This is evidenced by the Diamond Alkali Company's extensive solution mining efforts that took place near Painesville. The Diamond Alkali Company performed solution mining for salt in the vicinity of the Painesville FUSRAP Site from 1910 through 1977. Solution mining operations were conducted in seven (7) brine fields.

2.1.4 Surface Drainage

The primary surface water features on the Painesville FUSRAP Site are the UCC and LCC waste ponds, which are approximately 1.0 and 0.3 acres in size, respectively. According to UCC their waste pond was constructed in 1965 and never received any discharges from Diamond Magnesium Company (DMC) activities. This is supported by the results of the 1996 sampling which showed no AEC related constituents. The only current recharge to this pond is through rainfall and snow-melt. Since the LCC waste pond was built in recent years, it is unlikely that radiological constituents of concern (COCs) are present in this pond.

Surface water features near the Painesville FUSRAP Site include the Grand River, located approximately 0.2 km (0.1 mi)) southwest of the Fairport-Nursery Road; a waste pond (which was constructed subsequent to DMC activities) located between Fairport-Nursery Road and the Grand River; and Lake Erie, located approximately 2 km (1.2 mi) due north of the site. The Grand River empties into Lake Erie at Fairport Harbor, which is located 3 km (1.8 mi) west of the site.

An extensive storm water sewer drainage system is present on the eastern half the UCC property where the ground surface is primarily covered by concrete, asphalt, or is under roof. In these areas, surface water is quickly captured by the drainage system and ultimately discharged to the Grand River. The western half of the UCC property is covered primarily by grass and has a less extensive storm sewer system. Rainfall that does not result in runoff initially percolates through the upper few feet of fill material. The water accumulates at the upper surface of the natural soil, which is relatively impermeable due to its high clay content. Surface water runoff resulting from storm events is captured by the storm sewer system. The rate of evapotranspiration varies throughout the year and is dependent on temperature, humidity, and the seasonal growth of vegetation.

2.1.5 Meteorology

The climate in the vicinity of the Painesville FUSRAP Site is strongly influenced by Lake Erie. West-to-northerly winds blowing off Lake Erie tend to lower daily high temperatures in summer and raise temperatures in winter. The average annual temperature in the Painesville area is approximately 50° Fahrenheit (F) (DOC 1995).

Summers are moderately warm and humid with daytime temperatures occasionally exceeding 90°F. Winters are relatively cold and cloudy with an average of five days with sub-zero-degrees-F temperatures. Weather changes occur every few days from the passing cold fronts (DOC 1995).

The daily range in temperature is usually greatest in late summer and least in winter. Annual extremes in temperature normally occur near the end of June and December. The lowest temperatures occur most often in December, January, and February. Temperatures of 100°F or higher are rare. On the average, freezing temperatures in fall are first recorded in October while the last freezing temperatures in spring normally occur in April (DOC 1995).

Precipitation varies widely from year to year. However, it is normally abundant and well distributed throughout the year. In Painesville, the average annual rainfall is approximately 91 cm [36 inches (in)]. Showers and thunderstorms account for most of the rainfall during the growing season. Thunderstorms are most frequent from April through August (DOC 1995).

The average annual snowfall for the Cleveland area is approximately 142 cm (56 in), although 208 cm (82 in) of snow fell in 1995. The peak snowfall usually occurs between December and March (DOC 1995).

2.1.6 Surrounding Land Use and Populations

The Painesville FUSRAP Site is located in Lake County, Ohio, which borders Lake Erie. The county is divided into several tracts. The Painesville FUSRAP Site is located in Tract 2048, which has a total population of 2,722, and includes both urban and rural areas (LCPC 1990a).

As shown on Figure 2.1, the City of Painesville, located in Lake County (Tract 2042), is approximately 1.5 mi south of the Painesville FUSRAP Site. This city has a population of approximately 16,000 (LCPC 1990b). Over the last 15 years, the population of the city has been declining slightly (-3.8 percent). As a whole, Lake County has continued to grow in population (7.3 percent growth rate in 1990). This growth rate is attributed to an abundance of land and the continued trend toward suburbanization, drawing people to less developed portions of Lake County (NPD 1993). The majority of the population in Tract 2042 and 2048 are employed by manufacturing and retail trade industries (LCPC 1990a and LCPC 1990b).

The area immediately surrounding the Painesville FUSRAP Site, as well as a large portion of the Painesville Township in Lake County, is zoned as a heavy industrial area. However, there are recreational and residential areas nearby. South of the Painesville FUSRAP Site, a vacant lot in the northern portion of the City of Painesville is in the city plan as a future recreational area or golf course (NPD 1993). Painesville Township Park borders Lake Erie and lies approximately one-half mile north of the site area. Although there are some tree nurseries nearby, there is no agriculture in the area.

In Tract 2048, Lake Erie is the water source for 93 percent of the Lake County population. The remaining 7 percent of the population is supplied water by wells or other sources (LCPC 1990a). The nearest residences are approximately ¼ mile to the northeast. Drinking water for the City of Painesville is also supplied by Lake Erie. The water treatment plant for the City of Painesville supplies approximately 23,000 people and uses two intakes located west of Fairport Harbor (approximately 1.5 mi northwest of the site). The drinking water is tested regularly by the city and meets applicable drinking water standards. Recent information from the Ohio EPA indicates that there are no domestic water supply wells in the area (Zikmanis 2001).

2.1.7 Ecology

The Painesville FUSRAP Site consists of two industrial chemical complexes (UCC and LCC) with open grassy areas slated for future facility expansion. Currently all but one building on the UCC side of the site have been razed to ground level. The floors and foundations remain and continue to provide minimal habitat. The grassy areas are the only terrestrial habitat available on site for ecological resources. A small pond fringed with reeds (*Phragmites sp.*) is the only open water habitat identified. Two major water bodies adjacent to the site are Lake Erie and the Grand River; both possess major fishery resources used by the public.

The site potentially lies in a bald eagle (federally listed threatened species) migration route, with nesting pairs within a one county area, but no trees or large bodies of water exist on site to attract the bird. The site also lies within the range of the Indiana bat and piping plover, which are both federally listed endangered species. Open grassland is a favored hunting habitat for the protected barn owl, which may be present. Intensely managed aquatic resources on the Grand River and Lake Erie include primarily walleye and steelhead trout.

Communications regarding the ecological and historical sensitivity of the Painesville FUSRAP Site were initiated with the Ohio Department of Natural Resources (ODNR), the Ohio Historic Preservation Office and the U.S. Fish and Wildlife Service. These communications are documented in the EE/CA (USACE 1998b).

Communications with the Fish and Wildlife Service concluded that:

> "Due to the project type, site, and location, the proposed project will have no effect on these (threatened and endangered) species. This precludes the need for further action on this project as required by the 1973 Endangered Species Act, as amended."

Communications with the Ohio Department of Natural Resources and the Ohio Historic Preservation Office concluded that there are no existing or proposed state nature preserves or scenic rivers in the vicinity of the study area, nor are there any unique ecological sites, geologic features, breeding or non-breeding animal concentrations, champion trees, state parks, forest/wildlife areas, or any properties listed or eligible for the National Register of Historic Places.

2.1.8 Historic Values

The Ohio Historic Preservation Office concluded that there are no properties listed or eligible for the National Register of Historic Places.

2.2 SITE HISTORY

In the early 1940s, the Defense Plant Corporation constructed a magnesium production facility in Painesville, Ohio, on property owned by the DMC. In support of the war effort and later government operations, DMC operated this facility from the early 1940s to the early 1960s for the General Services Administration (GSA). The plant was sold by GSA in two parcels in 1963. At that time, UCC purchased approximately 15.5 ha (38 acres) as commercial property, located at 720 Fairport-Nursery Road. LCC purchased the second portion of the property [5.6 ha (14 acres)] located at 679 Hardy Road, which is adjacent to the eastern UCC property line (ORNL 1991). Combined, the two properties encompass the entirety of the property on which the Defense Plant Corporation operated (ORNL 1990, 1991).

There is no known history of processing or production of radioactive materials at the Painesville FUSRAP Site. The radioactivity present at the site resulted from the use of scrap ferrous metal to scrub chlorine gas released during the magnesium production process. The GSA sought such scrap metal from the AEC's inventories at the Lake Ontario Storage Area (LOSA) in Niagara Falls, New York. By the early 1950s, LOSA had accumulated significant quantities of scrap metal, in part because metal drums were used to ship and store residues from the processing of pitchblende ores. When the pitchblende residues were consolidated into a storage facility at LOSA, the emptied drums were cleaned for reuse or scrapped. These drums, which contained observable residues of pitchblende ores, were part of the scrap shipped to the Painesville FUSRAP Site (ORNL 1991). For this reason only those radionuclides associated with the pitchblende residues [primarily radium-226 (Ra-226), thorium-230 (Th-230) and uranium-238 (U-238) and their daughters] are considered MED/AEC related.

Since elevated concentrations of Thorium-230 (Th-230) have been identified at the site, it is suspected that at least some of these drums contained process residues from the St. Louis FUSRAP site. The relatively high concentration of lead coupled with elevated concentrations of Ra-226 found in one sample (taken from the east side of the former GSA property, in the vicinity of the railroad spur) is typical of the pitchblende residues once stored at LOSA (ORNL 1991 and Williams 1992). [Historical letters confirm that LOSA received waste drums from the St. Louis FUSRAP site. It is suspected that prior to October 1953, there was no official AEC policy for the processing and disposal of scrap metal containing residual radioactivity (DOE 1992 and Williams 1951).]

Approximately 1,650 tons of scrap metal were shipped to the Painesville FUSRAP Site. These shipments occurred in December 1951, July 1952, and April 1953, in the estimated quantities of 640 tons, 560 tons, and 450 tons, respectively (Hershman 1952, and Hershman 1953). The scrap metal was delivered by railroad to the western side of the property where it was stored on the ground with no cover. Former employees indicated an additional delivery route was also present on the eastern side of the buildings, where scrap was moved from the west railroad siding to the east siding by sliding uncovered rail-sided wooden skids or sheds pulled by a tractor (Eddington 1996). In a recent interview with a former plant manager he indicated that scrap was off loaded from both east and west spurs and was moved via rail car from one siding to another (Trumbel 2001). From the eastern side, the scrap metal was either immediately added to the hydrochloric acid (HCl) digester tanks or stored on the ground (ORNL 1990).

The scrap metal used to scrub chlorine gas was immersed into weak HCl for complete digestion. Liquid acid waste from the process was discharged directly into the Grand River until 1952, and intermittently after that. Seepage to groundwater and surface water from storage ponds across the Grand River may have occurred as well. A more detailed explanation of the processes and sources is found in the Fate and Transport Section (Section 5.1) of this report.

It is unclear if any other locations were used to dispose of sludge produced in the magnesium production process. However, a letter from C. D. Williams, GSA, to J. S. Quidor, AEC, dated October 9, 1951, states: "Sludge composed of ferrous chlorides and other wastes resulting from the acid reaction is dumped onto waste beds as refuse having no useful value. Any radioactive particles of low intensity would be distributed within the sludge and eventually buried within the waste pond" (Williams 1951). However, no other evidence or documentation of these waste beds has been found, and the site has been investigated and no likely locations have been identified.

Because the COCs in the scrap metal were related to MED/AEC activities, a preliminary and limited radiological survey was conducted by ORNL in 1988 to determine whether the site met the current radiological guidelines. The findings from this survey indicated that residual radioactivity is present at the site above existing guidelines for unrestricted use (ORNL 1990, 1991). The principle radiological COCs were determined to be U-238, Ra-226, Th-230 and their naturally-occurring decay products. Based on these initial surveys, the site was designated by DOE as a FUSRAP site for further evaluation and remedial implementation, as appropriate (Williams 1992). As discussed earlier the authorization for remedial action at the site only includes radionuclides that are related to MED/AEC activities.

2.3 PREVIOUS INVESTIGATIONS

The site has under gone a number of investigations relating to the occurrence of AEC constituents. The following is a brief outline of the events which are discussed in more detail in the following sections:

- 1988 ORNL site evaluation
- 1990 ORNL additional site evaluation
- 1996 DOE Site Characterization
- 1997 USACE is assigned responsibility for FUSRAP
- 1998 Publication of the Characterization report and EE/CA
- 1998 Removal Action
- 2000 Focused Remedial Investigation (RI) field work

2.3.1 ORNL Investigations

On October 10 and 11, 1988, ORNL performed a preliminary site evaluation of the UCC Property. ORNL performed a Gamma Walkover Survey over the study area and collected soil samples for radiological analysis. During the survey, information was obtained concerning other portions of the property which would need to be addressed as part of future efforts (ORNL 1990).

ORNL returned to the site in September 1990 to examine the property to the east adjacent to the railroad tracks, and owned by LCC, and to investigate areas which showed elevated gamma readings during the 1988 survey. The survey results (ORNL 1991) indicated that elevated concentrations of radionuclides were found in both surface and subsurface soil in excess of DOE guidelines for release of a property without radiological restrictions. DOE guidelines are set forth in DOE Order 5400.5, which specifies generic guidelines for residual concentrations of Ra-226, radium-228 (Ra-228), Th-230, and thorium-232 (Th-232) were 5 picocuries per gram (pCi/g) above background averaged over the first 15 centimeters (cm) (6 inches) of soil, and 15 pCi/g above background [averaged over 15 cm- (6 inches) thick layers] below this depth. The primary COCs were U-238, Th-230, and Ra-226 with activity levels as high as 76 pCi/g, 310 pCi/g, and 1,500 pCi/g, respectively.

During a site visit performed in April 1996 by SAIC and BNI personnel, it was reported during interviews with current and former employees that rubble was used by UCC to construct the roadbed north of the UCC waste pond. The remainder of the demolished building debris was reportedly disposed south of Fairport Nursery Road by UCC. The source of the building debris is not currently known. It was the subject of sampling during the DOE investigation in 1996 and sample data were shown in the 1998 Characterization Report (USACE 1998a) on Figure 3.6. Old foundations in the vicinity of the former HCl digesters were recently excavated; this building rubble is currently located in the southeast corner of the UCC property.

2.3.2 DOE Investigations

In 1996, BNI, SAIC and ANL, under contract to DOE, performed a detailed investigation of the Painesville FUSRAP Site area. This investigation included ambient air sampling, external gamma rate exposure measurements, building radiological surveys, gamma walkover surveys, groundwater sampling, surface geophysical surveys, surface water sampling, sediment sampling, ecological sampling, and soil sampling. This sampling specifically included both sediment and water sampling of the stormwater and acid sewer lines which were sampled at several locations on the site and at locations leading off the site. The Ambient air and external gamma sampling were also done at the boundary of the site to ensure no exposure to the public. All the other sampling was focused by the surface geophysical survey results. The results of this study are documented in the Characterization Report for the Painesville Site (USACE 1998a) and summarized in Table 2.1.

2.3.3 Removal Action

The objective of the removal action was to remove material identified in the EE/CA as exceeding the cleanup goal of 27 pCi/g Ra-226 specified in that document. This goal was presented in a public meeting in August of 1998. Slightly more than 1300 yd^3 were removed before the onset of winter caused the project to suspend operations. During the removal action a few samples were taken and analyzed for radiological constituents. Some of these samples were taken from material which has not been excavated by the removal. These samples have been included in this report.

3.0 REMEDIAL INVESTIGATION ACTIVITIES

This section describes the field activities (surveying and sampling) and analytical programs that were implemented to gather data on site characteristics and conditions in support of the RI. The primary objective of the investigation was to collect data of sufficient quantity and quality to evaluate the risk posed by current site conditions to human health and the surrounding environment. In the event that an unacceptable risk is calculated for the site, the data must be adequate to support an assessment of alternative actions. Data gathering during the investigation is presented in Section 4 of this report.

In the current investigation USACE has drawn on data and results from previous investigations to supplement data obtained for the 2000 RI. Use of all of this data has led to the development of a more comprehensive understanding of the nature and extent of contaminants at the Painesville FUSRAP site. Previous investigations led to the 1998 Removal Action. Excavation was halted before remediation of the site was completed, leading to the focused RI/FS.

The previous data sets, collected and validated, assisted in meeting the goals of the Technical Project Planning (TPP) elements for this focused RI/FS. The TPP Meeting (held in April 2000), the record review of documents and prior site knowledge led to a more focused Fate and Transport Evaluation and identification of applicable or relevant and appropriate requirements (ARARs) than had been developed for previous investigations. Because there had been no significant changes to the site since the 1996 sampling, and due to the nature of the COCs, the data from previous investigations was used both to guide the more recent investigations and in later evaluations of the nature and extent of contamination.

Based on what was previously known of the site hydrogeology, properties of known contaminants and the results of the SESOIL Model as presented in the Fate, Transport, and Exposure Analysis (SAIC 2000c), it was determined that radiological contamination did not pose a threat to groundwater at the site. Therefore, groundwater was not initially considered as a medium of concern. However, in order to be conservative, groundwater sampling was performed to document any impacts from radiological constituents to groundwater. In addition the groundwater pathway was included in evaluation of the subsistence farmer scenario in Section 6. Section 5.0, Constituent Fate and Transport, presents the source media and mechanisms affecting the migration of constituents at the Painesville FUSRAP Site. This information was updated using data collected during this RI field investigation. Previous information allowed the removal of surface water and sediment as media of concern. Therefore, soil was considered as the primary medium of concern for this RI.

Achieving these objectives required that representative samples of soil be collected across the site. The on-site soils were evaluated using a combination of systematic and biased sampling strategies depending on the specific objectives and data quality requirements. The investigative elements described in this section were designed to fulfill the Data Quality Objectives (DQOs) presented in the focused RI/FS Work Plan (SAIC 2000a) and to address information needs identified by previous site investigations (USACE 1998a and 1998b). The RI activities were conducted in accordance with the following: *Final Sampling and Analysis Plan (SAP) for the Painesville FUSRAP Site* (SAIC 2000b).

The field sampling activities were conducted using standard field procedures, developed specifically for the FUSRAP program as described in the SAP (SAIC 2000b). The actual field technical procedures are presented in Appendix A of the SAP (SAIC 2000b). The field procedures were reviewed by Ohio EPA, and comments were addressed before fieldwork commenced. These field procedures have not been reproduced in this document; however, supplemental information and any deviations have been noted where appropriate. Adherence to these procedures ensured that all samples were collected in a consistent manner and were representative of site conditions. Furthermore, consistency in the sample collection procedures improved the comparability of the analytical results.

As a part of the planning for the RI field activities, the comprehensive study area was divided into Investigative Areas (IA). Each IA represents a portion of the Painesville FUSRAP Site, delineated during the 1996 investigations, which will be addressed as an independent study area. The following eleven (11) areas were delineated in the SAP to group data collection activities (Figure 3.1):

- Area A (property surrounding the former butadiene tank area)
- Area B
- Area C (includes West Fence LCC property)
- Area D
- Area E
- Area F
- Area G
- Area H
- Area I
- Post 1950 Structures
- Rubble Pile (southeast corner of the UCC property)

The remainder of Section 3 provides detailed discussions on the specific RI activities that were conducted in order to acquire the data necessary to make risk-based decisions and guide the future environmental management of the Painesville FUSRAP Site. For ease of discussion, this section has been divided into the following subsections:

- on-site investigation activities,
- laboratory testing and analyses, and
- data evaluation process.

The objectives, rationale, and sample collection methods associated with the field activities are presented. An overview of the project DQOs and the laboratory testing program is provided. In addition, the validation procedures and data quality assessment (DQA) for the laboratory analyses are discussed. The last subsection presents the data evaluation process, which includes the identification of background values and a comparison of the data to background and established regulatory guidance levels. Analytical results and their implications, such as the nature and extent of potential contaminants, are discussed in Section 4.

3.1 SUMMARY OF ON-SITE INVESTIGATION ACTIVITIES

The on-site investigation activities have been conducted to identify potential source areas, test the various vertical zones of shallow soils to determine if they have been impacted by past operations, and delineate the extent of the impacted areas. These activities were accomplished by implementing a comprehensive sampling and analysis program consisting of the following:

- Gamma walkover survey
- Surface and subsurface soil sampling, and
- Groundwater sampling of selected monitoring wells.

A discussion of each of these work elements is provided below.

3.1.1 Project Goals

The overall project objective for field activities was to develop and implement procedures for field sampling, chain of custody (CoC), laboratory analysis, and reporting, which will provide results to be used in site evaluation and assessment leading to remediation which are technically sound and legally defensible. Procedures for sampling, CoC, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventive maintenance of lab and field equipment, and corrective action are described in Appendix C of the SAP, the Quality Assurance Project Plan (QAPP). The purpose of the DQOs is to address the objectives for data accuracy, precision, completeness, representativeness, and comparability. Data need requirements are incorporated in the body of the SAP, Appendix C (QAPP) Tables 3.1 through 3.5 and are also discussed in detail in the SAP.

DQOs are qualitative and quantitative statements that specify the quality of data required to support decisions made during investigation activities, and are based on the end uses of the data being collected.

The primary project goals developed for the RI at the Painesville FUSRAP Site are listed below. Each primary objective is subdivided into more specific goals.

1) Determine if radiological COCs are present in the soil media at the targeted IAs on the Painesville FUSRAP Site at concentrations posing risk to human health (site workers and surrounding public) and the environment. More specifically:

   - Determine the nature of radiological COCs.
   - Determine the physical conditions of the site media that promote or retard the mobility of constituents of potential concern (COPCs).
   - Determine the contribution of external radiation from MED/AEC contaminants to the total dose for site workers and the surrounding public and evaluate whether or not regulatory guidelines are being exceeded.

2) Determine and collect the type and quality of data required to evaluate a broad range of remedial action alternatives that will minimize or eliminate public health risks and impact to the environment. More specifically:

   - Determine the volume of impacted soil on the Painesville FUSRAP Site with radiological activity levels exceeding action levels.
   - Determine if soil exceeding radiological guidelines also qualifies as a Resource Conservation and Recovery Act (RCRA) hazardous waste (volume of mixed waste present at the site).
   - Determine the soil geotechnical properties conducive to on-site remedial solutions.

3.1.2 Gamma Walkover Survey

During the 1996 Gamma Walkover Survey the entire Painesville FUSRAP Site was investigated and several areas were identified with elevated gamma activity levels. The 1996 Gamma Walkover Survey procedures and results are detailed in the Characterization Report (USACE 1998a). For the 2000 investigation a number of walkover datasets were generated as a result of the RI. Walkover results for both Fidler and 2x2 sodium iodide (NaI) detectors were run on three different surfaces. These detectors are described in detail later in this section. Background for each surface was noted and has been incorporated into the analysis. Both Fidler and 2x2 NaI were used to allow the detection of weak gamma emitters like U-238 as well as more vigorous gamma emitters. The Fidler is better at detecting low energy gamma emissions. There is little overall difference between the areas indicated by the two detectors although detailed differences can be seen in the figures for each of the areas described below.

Based on the 1996 Gamma Walkover Survey, areas with 2.5-time-background gamma activity levels, or greater, were contoured and used to define the suspected perimeter of areas exceeding site action levels (USACE 1998a). The EE/CA (USACE 1998b) describes those areas which exceeded a sum-of-ratios (SOR) of 1.0 and the formulas used to calculate the SOR. These nine areas, for the purpose of this investigation, have been given a designation of Area A through Area I. Figure 3.1 identifies all of these areas as having a SOR (1996) of greater than one. Figures 3.2 through 3.6 illustrate these areas and the 1996 and 2000 sampling locations in much closer detail. Area A (the area surrounding the BDE tank) is the area that had the highest activity levels during the 1996 Gamma Walkover Survey. The other areas that showed elevated activity levels include the area west of Building 412, the vicinity of the eastern railroad spur, and a couple of areas north and west of the UCC waste pond.

For the purpose of refining the horizontal limits of the nine areas identified in 1996, another Gamma Walkover Survey was conducted as part of the 2000 RI Investigation. In addition to these nine areas, the 2000 RI investigation conducted a Gamma Walkover Survey on the western and eastern railroad spurs and portions of the Rubble Pile (shown on Figure 3.5).

Two types of radiological instruments were used to conduct the 2000 surveys. A Ludlum 2221 field instrument equipped with a G5 probe (FIDLER) was used to detect low-energy gamma radiation. High-energy gamma radiation was detected using a Ludlum 2221 equipped with a 2-inch by 2-inch sodium iodide (NaI) crystal. As gamma activity data were recorded in the field, the station locations were determined and recorded using Global Positioning System (GPS) receivers. All data were electronically recorded in the field and downloaded to a computer to produce graphic presentations of the results. Gamma Walkover Survey procedures were detailed in the SAP (Section 3.2.2).

Data generated from both the FIDLER and the 2x2 NaI were recorded on their respective GPS data loggers. The data were transferred daily from the data loggers to a computer for processing and storage. The data processing yielded gamma activity values with corresponding X and Y location coordinates, which were then compiled into high-resolution maps using graphic visualization software. Area specific maps of the low-level and high-level gamma activity (depending on the type of surface material) were created to identify and help further delineate boundaries of surface contamination. These maps were used as a guide for selecting the biased soil sample locations during the RI field activities.

The 2000 Gamma Walkover Survey results for the applicable Painesville FUSRAP Site IAs are depicted in Figures 3.8 through 3.19. For illustration purposes the figures of the gamma coverage have been broken into just three figures (Areas A, H &I, Area B and Areas C,D and Rubble Pile). Each of the areas where 2000 Gamma Walkover Survey occurred were surveyed with NaI and FIDLER detection instruments. Since the surveyed areas are covered with essentially two different types of surface material which shield the gamma rays differently, the surveys were also segregated based on the two types of surface materials: 1) Soil, and 2) Asphalt/Gravel. Therefore, each of the three areas covered by the figures has four different types of images. 1) NaI on Soil, 2) FIDLER on Soil, 3) NaI on Asphalt/Gravel, and 4) FIDLER on Asphalt/Gravel.

3.1.3 Surface and Subsurface Soil Sampling

From previous investigation results and the 1998 Removal Action the following areas were selected for soil sampling and analysis:

- Rubble Pile (southeast corner of the UCC property),
- Area A (property surrounding the butadiene tank),
- Post 1950 Structures.
- Area C (Lonza property adjacent to UCC west fence)

The SAP (SAIC 2000b), Table 1, presents a summary of the environmental sample collection activities originally planned for the RI. However, the 2000 Gamma Walkover Survey revealed the need for additional soil samples to be collected in the Rubble Pile, Area A, Area C (on the LCC property), Area B, Area D and Area G. These additional samples are discussed in the subsequent area-by-area sections. In addition Appendix A contains a photographic record of the RI sample locations, as directed in the SAP Section 4.1.1.

3.1.3.1 Soil Sampling Procedure

Section 3.2.1 in the SAP detailed the procedures and protocols used for soil sampling. At each of the soil sample locations, shown in Figures 3.2 though 3.6, the procedure dictated a maximum of three samples, and a minimum of one sample would be collected. The procedure established that the sample interval(s) would be directed by the results of a gamma radiation detector. At each sample location, a Geoprobe® or hand auger was used to retrieve a column of soil. The target and minimum total depth was six (6) feet below ground surface (bgs), or persistent refusal depth. The entire length of boring core at each sample location was scanned using a gamma radiation detector. The boring cores were scanned for gamma radiation in one (1) foot intervals (1 to 2 ft, 2 to 3 ft, etc). Each one foot interval represented a single potential sample. All intervals that had gamma radiation measurements two times (2X), or more, above the background gamma measurement were to be collected and sent to the laboratory for radiological analysis at a minimum. If a single length of boring-core had more than three intervals having gamma measurements above the 2X threshold, then only the three intervals (samples) that had the highest gamma measurements were to be sent off for laboratory analysis. At least one sample per boring was to be sent for laboratory analysis. If no intervals indicate gamma radiation above the 2X threshold, the one sample that had the highest gamma response was to be sent off for laboratory analysis.

When field changes and alterations to the field sampling plan were made, they were documented in the Daily Quality Control Reports/Task Team Activity Log Sheets (Appendix B) and the Field Change Request (FCR) logs (Appendix C). These changes are discussed in Section 3.1.2.2.

As documented in Appendix C (FCR No. 002) a clarification to the above sampling procedure was made in the field. The field change was initiated to determine from which interval of soil column to collect the sample if the entire length of soil column revealed gamma activity at or less than background. When the Gamma count revealed statistically identical readings, or less, of background, then the uppermost interval in the soil column (less the grass-root zone) was collected for lab analysis. Because the upper-most intervals are most likely to contain fill material they have the highest probability of containing MED/AEC radionuclides. These intervals also will have the greatest impact on dose rate and risk, based on pathways and scenarios.

Soil samples were collected using a stainless steel scoop, hand auger bucket, or from the geoprobe boring core. A volume of material sufficient for laboratory analysis was collected at each location. All soil samples were analyzed for the full suite of radiological parameters (Ra-226, Th-230, and U-238). One third of all soil samples were analyzed for full Target Compound List/ Target Analyte List (TCL/TAL) parameters for Investigative Derived Waste (IDW) profiling. Each sample location was noted in a logbook, photographed, and flagged in the field. After soil sampling was completed, the horizontal locations of each soil sample point was surveyed using GPS method.

All stainless steel tools used during sample collection were decontaminated as described in Section 6 of the SAP. IDW, generated during sampling and equipment decontamination activities, was managed as described in Section 7 of the SAP.

In addition to the collection of soil for radiological and chemical analysis, twenty (20) geotechnical samples were collected. The geotechnical parameters measured included moisture content, Atterburg limits, and grain size analysis. The geotechnical samples were collected by using the geoprobe to push a shelby tube of a sufficient length to retrieve a valid native material sample (between 1.5 and 3.0 ft). The locations of the geotechnical samples were field biased based on the following: 1) The geotechnical samples were collected from only native soil and not fill material. 2) The top portion of the shelby tube was of sufficient depth that no significant amount of roots were collected. To guide the proper depths for the collection of the biased geotechnical samples, the geoprobe first was advanced for the collection of the chemical samples. Based on the lithologic log from that boring, the prescribed depths for the geotechnical samples were determined. The horizontal location for the geotechnical samples was positioned within a two foot radius of the previously logged boring.

3.1.3.2 Field Changes to SAP Sampling Procedures

During the course of the Painesville FUSRAP Site's RI field activities, several field changes were made. These changes reflect conditions that had not been foreseen during the writing of the SAP or to make clarifications to ambiguous procedural language in the SAP. As the necessity of implementing the field changes became apparent the SAIC Chemical Quality Control (CQC) Representative (Field Operations Manager) followed the procedure from the SAP Section 11.5 (Major Field Change). Once the SAIC FCR form had been filled out, the SAIC CQC Representative would confer with the USACE-Buffalo District Project Manager or his representative. Prior to implementation of a proposed field change, agreement regarding said change would be reached. These changes constitute an alteration of the field sampling plan. The rationale behind the decisions regarding additional sampling and changes made to sampling protocol will be discussed in the following subsections. These alterations have been documented in the Daily Quality Control Reports/Task Team Activity Log Sheets (Appendix B) and the FCR logs (Appendix C). A summary of the field changes is included in Table 3.1.

Rubble Pile

The rubble pile located near the southeast corner of the UCC property, illustrated on Figure 3.5, was investigated during the 1996 Gamma Walkover Survey. Although the gamma walkover results were slightly elevated the results of the 1996 analytical sampling did not indicate the presence of levels of radioactivity sufficient to exceed a soil SOR (1996) of 1. However, the possibility remained that radionuclide contamination existed beneath the rubble pile. As a result, a more intensive sampling scheme was devised in the SAP (SAIC 2000b) to further define the nature and extent of possible MED/AEC contamination.

The SAP detailed a soil sampling scheme that would have collected samples from ten randomly located gridded sample locations within the rubble pile area. The surface samples were to have been collected from native soil beneath the rubble pile at the level that would have been the ground surface prior to the dumping of the rubble. A deeper sample would have been comprised of soil collected from 5 ft to 6 ft below the original ground surface. A Geoprobe® rig was to have been used to advance holes through the rubble pile. The SAP did state that the specified locations could have possibly posed a problem because of physical obstacles and access problems with the Geoprobe®. If that was a problem then the location would have to be moved as little as possible to allow Geoprobe® access. The determination would be made using best professional field judgment.

In the field it was obvious that the pre-gridded locations within the rubble pile could not be accessed with the geoprobe rig. Even if the rig could have reached the horizontal location specified in the SAP, sample depth requirements would have been unachievable without the use of a front-end loader to remove the rubble. The rubble consists mostly of large, boulder sized pieces of concrete, partially intact brick walls, and various lengths and thickness of rebar. The SAIC CQC representative conferred with the USACE-Buffalo District Project Manager representative and concluded the following:

- The sampling locations would have to be relocated as close as possible to the edge of the Rubble Pile, and
- Rather than collecting two discrete soil samples from each of the Rubble Pile locations (0-6 in and 5-6 ft) the samples would be collected following the soil sampling protocol set forth in Section 3.2.1. (See Appendix C, FCR No. 3).

Figure 3.5 illustrates the soil sampling locations in and around the Rubble Pile. Eight (8) geoprobe sample locations were placed along the edge and inside the outer edge of the Rubble Pile. Some of these eight locations were bias-selected in localized "low-spots" that would have channeled rain water runoff from the rubble piles. One (1) Geoprobe® sample location was advanced approximately a distance of 10 feet outside of the Rubble Pile limits (IARP-SB0009). This location had been flagged by a USACE-Buffalo District representative as having elevated gamma activity [30 thousand counts per minute (kcpm)]. One (1) hand auger sample location was advanced approximately 10 feet inside the Rubble Pile limits (IARP-SB0010) using hand-auger techniques. This location was selected because it was well inside the rubble limits, was a "low-spot" nestled among the rubble piles, and appeared to be a rain water runoff collection point.

An additional field change was made regarding the Rubble Pile soil sampling. Since drilling random sample locations within the Rubble Pile was unachievable, it was decided by the USACE-Buffalo District Project Manager to collect three (3) discrete/biased (based on Gamma Detection 2x2 NaI) samples from the interior of the rubble pile. The DOE in 1996 had completed a separate Gamma Walkover Survey in the Rubble Pile and had determined that contaminated soil existed in the eastern portion of the pile. Therefore, these three (3) additional sample locations were placed inside the limits of the eastern side of Rubble Pile (IARP-SB0011, IARP-SB0012, and IARP-SB0013). These three locations had surface gamma activity range from 27 kcpm to 116 kcpm. This field change is documented in Appendix C (See FCR No. 6).

Area A

Area A includes the soils around the BDE tank and the Removal Action excavation that was conducted in 1998. A number of samples were taken from this area both in 1996 and in 1998. The 1996 soil samples defined an area where the SOR (1996) exceeded 1. Also defined by the 1996 soil samples was an area containing Ra-226 greater than 27 pCi/g, within the SOR (1996) greater than 1. The 1998 Removal Action was driven by the area containing Ra-226 greater than 27 pCi/g. The 1998 confirmation samples and excavation presented two primary issues that required resolution during the RI field activities: 1) the extent of contamination above the cleanup guidelines needed to be redefined. This sampling effort included additional samples to refine the boundary; and 2) the space under the BDE tank, next to the tank pylons, along the west and south tank berms, as well as along the railroad tracks that border the east side of this area, were sampled.

The sample locations for Area A are shown on Figure 3.2. The 2000 Gamma Walkover Survey data was used to bias select the following sampling locations for Area A: eight (8) borings around the BDE tank, four (4) along the tracks, and four (4) sample locations through the asphalt spill containment basin.

The SAP also established a grid in Area A for a Multi Agency Radiation Survey and Site Investigation Manual (MARSSIM) final status survey. The MARSSIM grid was pre-established within the area excavated in 1998 and thought to be clean. This may be useful in allowing the early determination of the final number of samples for the final status survey and reduce later sampling requirements. The (four) 4 sample locations marked "M" on Figure 3.2 were sampled. One of the MARSSIM grid locations had to be relocated due to rig inaccessibility. This is documented in Appendix C (FCR No. 004).

Fourteen samples were collected around the foundations (pump-houses and pipe rack support piers) in the Area A vicinity. These sample locations were chosen to help determine whether or not MED/AEC contaminated soils had been used as backfill around structural footers or foundations.

Based on the 2000 Gamma Walkover Survey, it was decided by the USACE-Buffalo District Project Manager to collect two (2) additional discrete/biased (based on Gamma Detection 2x2 NaI) samples from the interior of Area A. These two (2) sample locations were placed in an area that had a surface gamma reading of 300 kcpm. These additional samples were collected to determine the presence of MED/AEC related contamination in the soil by sample analysis. This constituted a field change and is documented in Appendix C (FCR No. 007).

Post 1950 Structures

Although most of the buildings on the Painesville FUSRAP Site pre-date the presence of MED/AEC contaminated materials, several do not. It was decided that the fill used around the post-1950 structures be investigated to determine if contaminated soils were used as structural backfill. Therefore, the foundation fill around Buildings 413, 414, 415, and the Methylene diparaphenyline Isocyanate/Toluene diisocyanate (MDI/TDI) Transfer Station was investigated. Four (4) sample locations were placed around the foundations of each of these buildings. The RI sample locations for the Post 1950 Structures are shown on Figure 3.6.

West Fence Lonza Chemical Company Property (Area C)

The area between the MDI/TDI Transfer Station on the UCC property and the LCC Building No. 165 was investigated during the 1996 Gamma Walkover Survey. Soil samples were collected in 1996 from areas suspected to have elevated levels of radionuclide contamination based on the 1996 walkover survey. From those 1996 soil samples an area was determined to have a SOR (1996) greater than 1 (Area C). Although the results of the 1996 sampling did not indicate the presence of levels of Ra-226 greater than 27 pCi/g (threshold used to determine zone of 1998 remediation), there remained one location across the west fence in the LCC property that had an SOR (1996) greater than 1. As shown on Figure 3.4, two (2) samples were initially collected for the 2000 RI investigation (IAC-SB001 and IAC-SB002), as described in Section 3.1.2 of the SAP (SAIC 2000b), offsetting the north and south of sample location BH0084. The east side of BH0084 was sampled in 1996 with no radionuclide results above the stated thresholds.

During the 2000 Gamma Walkover Survey on the LCC property, elevated levels of gamma were detected along the West Lonza Fence (adjacent to Area C). It was noted during the walkover that "slag-like" material was laying on the ground surface along the fence line. To determine whether or not MED/AEC related material was causing the elevated gamma radiation it was decided by the USACE-Buffalo District Project Manager to collect three (3) additional soil samples (IAC-SB003, IAC-SB004, and IAC-SB005). The locations were biased selected at points of highest gamma activity next to the fence. These were collected using a hand auger to a depth of 1 foot. This constituted a field change and is documented in Appendix C (FCR No. 005).

The USACE decided to further investigate the elevated gamma activity on the Lonza portion of Area C. This constituted a field change and is documented in Appendix C (FCR No. 007). Four (4) additional boring locations (IAC-SB0006 through IAC-SB0009) were located in an attempt to establish boundaries for any possible MED/AEC related material during this mobilization.

Areas B, D, and G

The Gamma Walkover Survey results characterized additional areas that required further investigation. Area B had soil samples collected from two locations; Area D had soil samples collected from four locations; and Area G had one sample collected from a location. These additional soil sampling location points are illustrated in Figures 3.3, 3.5, and 3.2, respectively. These additional samples constituted a field change and are documented in Appendix C (FCR No. 007).

3.1.4 Groundwater Sampling

In the spring of 2001 eight pre-existing monitoring wells were sampled in order to verify the results of the SESOIL model (Section 5.1). The wells were selected, by USACE with the concurrence of Ohio EPA, based on an understanding, of their location, upgradient and downgradient and in proximity to the known soil contamination. Also considered were wells showing elevated gross alpha and beta-gamma measurements in groundwater samples taken by the site owner. Although the model of the groundwater flow has changed the locations still represent a reasonable selection of wells. Groundwater was sampled and analyzed for Ra-226, isotopic thorium and isotopic uranium. The eight locations are shown in Figure 3.7.

3.2 BACKGROUND SAMPLING

Previous background measurements were collected to support the Characterization Report (USACE, 1998a). In 1996 a total of sixteen (16) soil samples (including one duplicate sample) were collected for the purpose of defining the characteristics of the natural background soils. These samples were collected from three shallow boreholes positioned over undisturbed areas identified in a park located approximately 1 km (0.5 mi) north of the site. Boreholes were drilled and sampled to depths ranging from 3-feet to 4.5-feet. All samples were analyzed for U-238, Ra-226, Th-230, Th-232, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Samples collected from one boring were also analyzed for actinium-227 (Ac-227) and protactinium-231 (Pa-231). The background measurements recorded in the characterization report will be used as background values for this RI field activity. Table 3.5 presents the background values from the 1996 sampling.

3.3 ANALYTICAL PROGRAM

The sampling and analysis programs conducted for the RI at the Painesville FUSRAP Site included the collection and analysis of soil samples. Field screening of samples was conducted for health and safety reasons and to select sample collection intervals. Samples were collected and analyzed according to the requirements of the SAP (SAIC 2000b) and Appendix C of the SAP's QAPP. This QAPP was prepared in accordance with EPA QAPP and USACE guidance documents, *EPA Guidance for Quality Assurance*

Project Plans (EPA 1998), *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA 1994a), and *Requirements for the Preparation of Sampling and Analysis Plans* (USACE 1994).

The following sections present the program DQOs, field screening methods, an overview of the analytical program, and a summary of the DQA.

3.3.1 Field Screening Methods

Each of the soil samples collected on site as part of the RI field activities was screened in the field for organic vapor content and radiological activity using hand-held instruments. The semi-quantitative field measurements were used for health and safety concerns and to select samples for more extensive laboratory, chemical, and radiological characterization. Results of these field measurements were recorded in the field on dedicated hazardous, toxic or radioactive waste (HTRW) drilling log forms at the time of sample collection. These field HTRW Drilling Logs have been transposed onto electronic Soil Boring Logs. The electronic Soil Boring Logs are presented in Appendix E. The original HTRW Drilling Logs are on File (copies available upon request).

Most of the surface and subsurface soil samples were screened for organic vapor content using a PhotoVac Micro Tip photo-ionization detector (PID). This instrument was used to measure the combined concentration of a wide array of organic compounds in the parts per million range. It was not capable of discriminating between concentrations of individual organic compounds, but it was useful as a general survey tool to locate areas of elevated organic contamination. Each 1-ft core of soil was scanned with the PID immediately after the sampling device was opened and the soil was exposed. The readings were used to upgrade or downgrade the levels of personal protective equipment (PPE) as necessary, but they were also used to decide when to collect samples for laboratory VOC analyses.

Gamma radiation field screenings were conducted on all soil cores obtained from intrusive sampling. The scans were performed immediately after the sampling device was opened, exposing the soil, and prior to placing the samples in containers. The instrument used to measure gamma activity included a Ludlum 2221 with a 44-10 probe (single channel analyzer with 2x2 NaI detector). This tool was used for qualitative indication of contamination and as a guide for directing further sampling activities when contamination was detected. The gamma field screening procedure used for selecting samples to be laboratory analyzed is described in Section 3.1.1. Upon completion of sampling within each of the defined IAs, total and removable alpha and beta-gamma contamination surveys were performed on sampling equipment and materials, sample containers, and personnel. In addition, smears of sampling equipment and sample containers were collected and analyzed in the field office using an Ludlum 2929 with 43-10-1 probe. All radiological instrumentation used at the Painesville FUSRAP Site during the RI field activities are listed in Table 3.2.

Calibrations of the PID and response checks to the radiological instruments were checked each day prior to use. The field calibrations were performed according to directions provided by the instrument manufacturers and were recorded on calibration log sheets. If an instrument could not be successfully calibrated, it was taken out of service and repaired. A sufficient number of instruments were maintained on site as replacements while instruments were being repaired.

3.3.2 Overview of Laboratory Analytical Parameters and Methods

Samples were analyzed by independent laboratories under contract for the investigation. The analytical laboratories, parameters, and methods are in Table 3.3. Strict adherence to the requirements set forth in the QAPP was required of the analytical laboratories so that conditions adverse to quality would not arise.

Laboratory standard operating procedures are based on the methods as published by the Environmental Protection Agency (EPA) in Test Methods for Evaluating Solid Waste, *Physical/Chemical Methods SW846*, Third Edition (November 1986; Revision 1, July 1992; Revision 2, November 1992; and Updates 1, 2, and 3).

Analytical data were validated according to the guidelines and procedures described in these documents:

- *National Functional Guidelines for Organic Data Review, Multi-Media, Multi-Concentration*, USEPA December 1990, Revised October 1999;
- *Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses*, USEPA February 1988, Revised February 1994; and
- *SAIC Quality Assurance Technical Procedures; Volume I, Data Management: Data Validation Procedure, Revision 3*, September 1996.

Approximately 10% of the data was validated as specified in the Painesville QAPP (SAIC 2000). The validators were responsible for (1) reviewing laboratory data packages and applying required control limits, (2) using professional judgment where specific limits were not specified, (3) qualifying affected data points on applicable results forms, and (4) preparing a data validation report for actions taken.

Analytical validation results were reviewed before incorporating validation qualifiers into the Painesville RI electronic database. The validation results were reviewed for consistency and completeness to resolve any questions. After the validation qualifiers were incorporated into the database an output report was printed and compared to the input data. All changes were documented and incorporated into the Painesville RI database as the final qualifiers.

3.3.3 Analytical Data Quality Assessment

The DQA describes the evaluation of the data quality indicators (DQIs) that were used to assess the quality of the analytical data collected for the Painesville RI. The DQIs (accuracy, precision, completeness, representativeness, and comparability) are assessed with respect to the project DQOs. Project DQOs establish the data end uses and end users and provide objective criteria by which the data quality can be measured. More importantly, the DQO process identifies the up-front protocols, processes, procedures, and methods by which the DQOs can be met. With the appropriate planning for project DQOs, their achievement provides the basis for concluding that the acquired investigation data are scientifically sound, legally defensible, and adequate for their intended use.

DQIs were found to be sufficiently in control. All project DQOs were met. The Painesville FUSRAP Site's Data Quality Assessment Report is provided in Appendix F.

Quality Assurance/Quality Control (QA/QC) samples were collected during the field effort to assist in the data quality assessment. QC samples include field trip blanks, field duplicates, laboratory method blanks, laboratory control samples, laboratory duplicates, and matrix spike/matrix spike duplicate (MS/MSD). QC samples were analyzed by the contract laboratories. QA samples are split samples analyzed by an independent laboratory (Nuclear Technological Services, Inc., Roswell, GA provided both radiological and chemical quality assurance (QA) services). Table 3.4 presents the primary samples and associated split and field duplicate samples.

3.4 REMEDIAL INVESTIGATION EVALUATION PROCESS

3.4.1 Overview of the Evaluation Process

A major step in evaluating the RI data is to distinguish between constituents that are likely related to past waste handling and/or disposal practices at the Painesville FUSRAP Site and those that may be present at naturally occurring or background levels. As part of the 1996 Characterization Study (USACE 1998a), and as described in Section 3.2, background samples were acquired for the soil media. This data set was evaluated to establish concentrations of radiological constituents that could be considered as background for the soil tested. Results of the RI sampling and previous sampling events conducted were compared to the background concentrations to identify areas possibly impacted by MED/AEC-related contaminants.

The nature and extent of MED/AEC-related contaminants identified for the Painesville FUSRAP Site were evaluated. This evaluation was performed to help delineate the boundaries of the contaminants and determine whether their occurrence was localized or widespread. The calculated background concentrations and the extent of contamination were then used in a baseline risk assessment (BRA) to evaluate the potential risk to human health and the environment.

As an initial step in the risk assessment, radiological elements identified as MED/AEC-related contaminants were compared to relevant regulatory standards, risk-based guidelines, and preliminary remediation goals (PRGs) to quantify the significance of their occurrence. In addition, contaminants detected above the 95% upper tolerance limit (UTL) of background were screened using weight-of-evidence techniques. Elements or compounds that were determined to be below these guidelines were eliminated from further consideration in the risk assessment. MED/AEC-related contaminants that failed the initial screening were designated as COPCs and were examined more critically to evaluate the risk to human and ecological receptors. An exposure and toxicity assessment was performed for each of the COPCs to determine the actual COCs. COCs were identified as those COPCs that exceed acceptable risk criteria established by EPA for each receptor and pathway. The COCs represent the main contributors to human health and ecological risk that will need to be addressed during potential remedial actions. A detailed description of these steps is presented in Section 6.2, the Baseline Risk Assessment.

3.4.2 Background Statistics and Comparisons

The 95% UTL was used to identify which radiological constituents detected at the site were present above naturally occurring background levels. The UTL is an upper confidence limit for a given percentile of the background data set. It represents the concentration below which 95% of the background sample data fall with 95% certainty. Background values were established for each appropriate radioisotope.

The calculation of the 95% UTL is dependent on the distribution of each analyte in the background data set. The Shapiro-Wilke W-statistic was used to determine whether the background data set was most like a normal or lognormal distribution. If the distribution was considered lognormal, log-transformed data were used to calculate the UTL; otherwise, untransformed data were used. For calculation purposes, results less than the detection limit were set to one-half the quantitation limit. If there were fewer than 50% detects, or fewer than 10 total samples, the UTL was not calculated. The maximum concentration above the detection limit was used as the background criterion if a UTL could not be calculated or for distributions that were neither normal nor lognormal. If the maximum detected concentration was less than the UTL then the maximum detected concentration was used as the background comparison.

The equation used to calculate the 95% UTL for analytes with a normal distribution was:

$$UTL = \bar{x} + k(s),$$

For lognormal distributions, the equation used to calculate the 95% UTL with log transformed data was:

$$UTL = e^{\bar{x} + k(s)},$$

where:

$\bar{x}$	=	analyte arithmetic mean,
k	=	k statistic table-value, dependent on the sample size (Gilbert 1987),
s	=	sample standard deviation, and
e	=	exponential conversion for lognormal data.

Data collected from the Painesville FUSRAP Site were compared to the 95% UTL of the background data set (Table 3.5). To apply the background 95% UTLs to the MED/AEC-related data, each individual result in a given media, and aggregate where applicable, was compared to the constituent-specific 95% UTL. If the concentration of an analyte from the site data was larger than the calculated background 95% UTL, the site data was determined to be above background and designated as a MED/AEC-related COPC. If the concentration of an analyte from the site data fell below the 95% UTL, the data were considered to be indistinguishable from background. Specific analytes that were not detected at concentrations greater than the 95% UTL were considered naturally occurring and, therefore, not related to industrial operations at the site. Conversely, if the concentration of a specific analyte from the environmental samples was greater than the calculated 95% UTL, the sample data was considered above background and designated as a site related contaminant although not necessarily a MED/AEC related contaminant.

Tables of background values for each environmental media were developed using the methods outlined above. The soil background values are listed in Table 3.5. Tables of related statistical values such as the maximum, minimum, and average detected concentrations, as well as the background values appear in Table 4.1. Analytes were placed in the following categories: (1) analytes sampled for but never detected, (2) analytes detected but always at concentrations less than the background values, and (3) analytes detected above background criteria. Analytes in the third category were considered as COPCs. A discussion of the nature and extent of the identified contaminants is provided in Section 4.

3.4.3 Remediation Goals and Regulatory Guidance Levels

Constituent-specific PRGs are acceptable concentration values for individual chemicals for specific medium and land use combinations. PRG values may be used for preliminary evaluation of the nature and extent of contamination. PRGs may be risk-based, based on ARARs, or background concentrations for naturally-occurring constituents. PRGs are typically developed during project scoping (DQO development) or concurrently with early RI and feasibility study activities in order to facilitate the development of appropriate detection limits and potential remedial alternatives.

Action levels for the COPCs related to past AEC activities at the site are presented in this RI report. These action levels consist of dose-based values developed in accordance with the potential ARARs for radiological contamination in soil. For some radionuclides, more than one remediation goal is available for a given medium. In these cases, the basis for the goal was considered in determining the appropriate one to use. For example, where background concentrations exceed risk-based concentrations, the background values should be used as the basis for evaluating site data. However, it should be emphasized that PRGs are not intended to be used as final cleanup values. Final cleanup values will be developed after the BRA has been completed. In addition, action levels are developed in the BRA to assist with remedial alternative development.

The various PRGs for radiological constituents in soil are presented in the risk assessment contained in Section 6 of this report. The PRGs for soil were developed for industrial, residential and subsistence farmer land use scenarios. These PRGs were used together with site-specific background values to identify potential MED/AEC-related contaminants for further evaluation in the risk assessment.

3.4.3.1 ARAR-Based PRGs

If a proposed ARAR for a site sets remediation goals for particular constituents, then these would be considered ARAR based PRGs. ARAR-based action levels are derived from promulgated standards that may be considered as cleanup goals for a particular site. Action levels are constituent and site specific. There are two regulations identified as potential ARARs in the RI. Standards set forth in 10 CFR 20 Subpart E establish a dose equivalent of 25 mrem/year for the critical group under a restricted or unrestricted use scenario. OAC 3701-1-38-22 adopts the same required dose equivalent as 10 CFR 20 Subpart E. However, the dose must be for unrestricted use unless a license will remain in place and the critical group consistently used by Ohio is the subsistence farmer. Action levels have been used at Painesville since the potential ARARs do not set any constituent specific PRGs.

3.4.3.2 Background-Based PRGs

Site-specific background concentrations of naturally occurring constituents in soil were sampled and analyzed during the 1996 Characterization Study (USACE 1998a). Previous Section 3.4.2 details the calculation for determining the background values (95% UTL) used as PRGs in this report.

4.0 REMEDIAL INVESTIGATION RESULTS: NATURE AND EXTENT

The results of the radiological analyses conducted by the contract laboratories are used in this section to identify potential MED/AEC-related contaminants. This section includes the results from the samples collected under the RI field activities, during the 1996 field activities (as detailed in the 1998 Characterization Report (USACE 1998a)), and the 1998 Removal Action (USACE 1999). For the discussion in this section, those potential MED/AEC-related contaminants have been narrowed to U-238, Th-230, and Ra-226. Section 6.0 (Baseline Risk Assessment) will discuss a broader array of radiological constituents as they relate to human health risk issues.

Based on the previous investigation at the Painesville FUSRAP Site (1996) and the 2000 Gamma Walkover Survey results, Areas E, F, and H are not evaluated for nature and extent of MED/AEC-related contaminants. The 1996 soil sampling results (USACE 1998a) indicated that Area E, F and H do not contain MED/AEC-related contaminants at levels exceeding the potential ARARs. The 2000 Gamma Walkover Survey results (see Figures 3.8 through 3.19) confirm the 1996 soil sampling results. Since no significant construction activities disturbing the soil in these areas took place between 1997 and 2000, and considering that radionuclides are relatively difficult to leach from the soil this confirmation was expected.

Radiological concentrations detected in soils were compared to the background data set (as discussed in Sections 3.2 and 3.4.2) in order to quantify the significance of radionuclide occurrences. For presentation purposes, the evaluation is divided into the following remaining investigative areas:

- Area A (property surrounding the former butadiene tank area)
- Area B
- Area C (includes West Fence Lonza Chemical Co. Property)
- Area D
- Area G
- Area I
- Post 1950 Structures
- Rubble Pile (southeast corner of the UCC property)

The nature and extent of MED/AEC-related contaminants are described for each of these units. These discussions rely on comparisons with the background data set to establish contaminants that may be a potential concern. Background sampling of the soils at the Painesville FUSRAP Site is presented in Section 3.2. Radiological MED/AEC-related contaminants that were detected above background levels are presented in the summary tables (Tables 4.1.a through 4.1.h). The distributions of the radiological MED/AEC-related contaminants identified for each unit are illustrated on figures to permit further evaluation of their nature and extent (Figures 4.1 through 4.18). These figures present only the 2000 walkover data which was designed to supplement and confirm the 1996 data. The entire site walkover from 1996 is presented in the Characterization Report (USACE 1998a).

Each unit discussion concludes with a brief synopsis of the nature and extent of radionuclide contamination associated with the Painesville FUSRAP Site. Results from the 1996, 1998 and 2000 soil sampling have been integrated into the discussion. A general discussion of the MED/AEC-related contaminants identified on site is provided. All contaminants detected above the respective background levels will be further evaluated in the BRA in Sections 6 and 7. A complete listing of all sample analytical results (including chemical constituents) is provided in the Matrix Tables (Appendix G).

The total TAL/TCL chemical constituents were sampled and analyzed for the characterization of IDW only, as previously discussed in Section 3. The nature and extent of chemical constituents is not presented in this RI Report. However, Tables 4.3a through 4.3e summarize the chemical constituents detected in each of the investigative areas.

In addition to radiological and chemical analyses, twenty (20) geotechnical samples were collected. This information will be used in planning the remedial alternatives since it relates to the density and expansion of the soil which might be excavated. The geotechnical parameters measured included moisture content, Atterburg limits, and grain size analysis. Table 4.4 presents the geotechnical results.

The exposure scenarios discussed in Section 6 were used to develop PRGs based on the potential ARARs. The values obtained from the Residual Radiation Program (RESRAD) are listed below.

Radionuclides	Activity-concentration for 25 mrem/year dose (pCi/g)
Radium-226	3.1
Thorium-230	5.9
Uranium-238	204

Although only 3 radionuclides are presented they represent the major risk drivers and analysis of the data shows that other elevated radionuclides would be removed if the PRGs are met during remediation. Using these values a SOR calculation was done to derive potential volumes of contaminants needing to be addressed. The formula for the SOR is:

SOR= Ac-227/6.8 + Ra-226/2.0 + Ra-228/3.9 + Th-228/6.1+ Th-230/5.9+ Th-232/2.3 + (U-234 + U-235 + U-238)/260

Each radionuclide is represented in the equation by the activity above background in each sample. The guideline for Ra-226 is different from that in the table since it includes the contribution to dose from Pb-210. Ratios for samples with activities less than background were set to 0 rather than factor in a negative result.

The SOR calculated from the 1996, 1998, and 2000 soil sample results (based on the 25 mrem/year dose to a subsistence farmer required by the potential ARARs) will be designated as "SOR (2000)" to distinguish it from the SOR that was calculated for the Characterization Report using the 1996 soil sampling results. That previous SOR is designated as SOR (1996).

Tables 4.1.a through 4.1.h provide a summary of the potential MED/AEC-related contaminants detected in the eight (8) investigative areas listed above. The Tables include a list of potential MED/AEC-related contaminants detected, their frequency of detection, minimum and maximum detected values and locations, average concentration, and background levels. Several figures have also been created to illustrate the nature and extent of potential radiological MED/AEC-related contaminants associated with each area. Each figure illustrates concentrations detected in one of the three (3) potential MED/AEC-related contaminants at each soil boring location. For discussion purposes, these figures also segregate samples collected from surface soils (0-feet bgs to 2-feet bgs) and subsurface soils (greater than 2-feet bgs). These figures also show outlines of the SOR (2000) limits, as represented in the model that created them. This model, the Earth Vision Model (Version 5.1) calculated the area (or horizontal) extent and volume of contamination. Earth Vision is a computer program that provides 3 dimensional interpolation using a minimum tension gridding algorithm. It was developed for use by the petroleum industry for calculating volumes and displaying geologic structures. It is considered "state of the art" for commercial software. Input to the program is the concentration plus coordinates (x, y, and z). Table 4.5 summarizes the volumes and areas. The volumes and areas presented in the tables and discussed in the text below are based on the 25 mrem/year dose to the average member of the critical group (Subsistence farmer) as defined in OAC 3701-1-38-22. Tables 4.3a-e summarize the chemical analyses for the site by investigative area.

4.1 AREA A

The soils contained within Area A boundaries, approximately an area of 20,129 ft^2 (1870 m^2), were evaluated in the RI by collecting intrusive samples from strategically placed borings and submitting the samples for laboratory testing of a wide array of chemical and radiological parameters. Area A includes the soils around the BDE tank and the portion excavated during the 1998 Removal Action. A number of samples were taken from this area both in 1996 and in 1998. The 1996 samples defined an area where the SOR (1996) exceeded 1. Also defined by the 1996 samples was an area containing Ra-226 greater than 27 pCi/g, within the SOR (1996) greater than1. The 1998 Removal Action was driven by the area containing Ra-226 greater than 27 pCi/g.

The RI field activities in Area A targeted the soil sampling on the following areas:

- (2 samples) BDE Tank Pylon samples (under the tank, from structural backfill material);
- (8 samples) BDE Tank samples (around the periphery of the tank);
- (4 samples) Railroad (RR) Track samples (along the tracks);
- (4samples) MARSSIM samples (from pre-established grid);
- (14samples) Foundation samples (pump-houses and pipe rack support piers);
- (2 samples) Extra samples (based on Gamma Walkover Survey);
- (4 samples) Spill Containment Basin samples (collected from under the asphalt).

The RI field activities conducted in Area A are described in detail in Section 3.0. The distributions of the three (3) radiological MED/AEC-related contaminants in the surface and subsurface soils in Area A are shown in Figures 4.1 through 4.6.

Table 4.1.a provides the summary of the detected MED/AEC-Related Contaminants in Soil. In Area A, the summary consists of analytical results from the 1996, and 2000 RI soil samples. The following narrative pulls together all the soil samples from those three sample events (1996, 1998 and 2000) that were of sufficient quality and quantity to conduct data validation, and had known horizontal and vertical coordinates. If a sample's location was collected from the excavation zone that had been removed in 1998, that sample was removed entirely from the data set. Samples that remain in the excavated area were deeper than the excavation. The samples in the area of the excavation, collected during the 2000 field effort were taken below the liner placed in the 1998 excavation.

Including all three sampling events 165 soil samples from Area A reflect current soil conditions and remain relevant to an evaluation of nature and extent. Of that number 63 of 131 exceed the Ra-226 background, 38 of 125 exceed the Th-230 background and 45 of 125 exceed the U-238 background. The maximum values for Ra-226, Th-230 and U-238 are 862 pCi/g, 422 pCi/g and 282.7 pCi/g respectively. Figures 4.1 through 4.6 show the maximum value of target constituents measured in each boring (either surface or subsurface) in Area A along with a boundary showing the limits of the 25 mrem exposure. As described in the previous section, this boundary also is the SOR (2000) greater-than-1 limit. The highest levels of each radionuclide are found along the former rail bed and south of the butadiene tank, particularly around the foundations of the old pump house. These figures are color coded to indicate how many multiples of background the maximum activity is for each boring. They also have the actual value in pCi/g posted next to the symbol.

In general the elevated radionuclide levels are found in the upper several feet of soil; however, in SB0032 (Figure 4.4) activity-concentrations above background are present between 8 and 10 ft bgs. For radium only 14 of the 63 samples that exceed background are greater than 2 ft in depth and only 5 exceed 5 ft. The most significant of these is the 139.4 pCi/g in SB0031 from 8 to 9 ft (Figure 4.4). This boring is located on the asphalt berm around the spill containment basin so the actual depth is only 6 or 7 ft bgs. The same sample contains 98.5 pCi/g of Th-230 and the maximum U-238 activity concentration (282.7 pCi/g) found in area A.

Figures 3.8 through 3.11 present the latest walkover data for Area A. The contaminated zone just south of the butadiene tank (center of East Plume area) is clearly visible as are areas along the former rail bed particularly at the south end of area A in the spill containment basin. Another small area west of the walk way is indicated. These areas were sampled as shown in Figure 3.2.

The estimated volume of material exceeding the proposed ARAR (25 mrem/year limit) for a subsistence farmer scenario in area A is 1,920 (cubic yards).

4.2 AREA B

The soils contained within Area B boundaries, approximately an area of 2583 ft^2 (240 m^2), were evaluated in the RI by collecting intrusive samples from strategically placed borings and submitting the samples for laboratory testing of radiological parameters. Area B includes the soils along the eastern rail spur in the east central portion of the site. A number of samples were taken from this area in 1996. The 1996 samples defined an area where the SOR(1996) exceeded 1. This area contained no samples with a radium activity exceeding 27 pCi/g and was not addressed in the 1998 Removal Action. Fall 2000 activities for this area included a gamma walkover and two borings north of the previously identified area. Figure 3.3 shows Area B and the borings near it. Figures 4.7 through 4.12 indicate the maximum activity-concentration in each borehole both by annotation and with color coding segregated by MED/AEC-related contaminants and surface or subsurface depths. Table 4.1.b contains a summary of the data for this area.

Nine of 16 samples from this area exceeded Ra-226 background with a maximum concentration-activity of 10.64 pCi/g in the top 6 inches of BH0089. Eleven of 16 samples exceeded the Th-230 background with the maximum of 10.47 pCi/g occurring in SB0001. Five of 16 samples analyzed for U-238 exceeded the background activity. The maximum concentration of U-238 was 8.35 pCi/g in the interval from 6 inches to 1.5 feet in the same bore hole as the Th-230 maximum. This boring is 12 m west of the old rail tracks and 4 m south of a storage tank berm.

No samples exceeding background are deeper than 3.5 feet and all but 2 are less than 1.5 feet.

The estimated volume of material exceeding the proposed ARAR (25 mrem/year limit) for a subsistence farmer scenario in area B is 600 yd^3.

4.3 AREA C

The soils contained within Area C boundaries, approximately an area of 9795 ft^2 (910 m^2), were evaluated in the RI by collecting intrusive samples from strategically placed borings and submitting the samples for laboratory testing of radiological parameters. Area C includes the soils along the eastern rail spur in the south east portion of the site. A number of samples were taken from this area in both 1996 and 2000. The 1996 samples defined an area where the SOR (1996) exceeded 1. This area contained two samples with a radium activity exceeding 27 pCi/g but was not addressed in the 1998 Removal Action. Fall 2000 activities for this area included a gamma walkover and nine borings predominantly southeast of the previously identified area as shown on Figure 3.4.

Thirty two of 57 samples analyzed for Ra-226 exceeded background as did 23 of 53 samples analyzed for Th-230 and 25 of 57 samples analyzed for U-238. The maximum values were 285.05 pCi/g, 311.8 pCi/g and 320.2 pCi/g for Ra-226, Th-230 and U-238, respectively. The maximums concentrations all occur in the same sample from the top 6 inches of boring SB0003 which is located just east of the fence on the Lonza property due east of the old MDI/TDI transfer facility. Figures 4.13 through 4.18 show the maximum activity-concentration of each radionuclide detected in both surface and subsurface soils. Table 4.1c contains a summary of the radiological data for this area.

Two samples containing U-238 above background are deeper than 2 feet. Three samples exceed background for Ra-226 and are deeper than 2 feet and five samples exceed background for Th-230 at depths greater than 2 feet. The deepest sample to exceed background is from 4.5 feet in BH0055. This sample exceeds the U-238 background by about 0.5 pCi/g. It is located in the middle of Area C between the MDI/TDI transfer facility and the old rail spur. This area is in the vicinity of the HCl acid digesters that were used during the magnesium production process. These digesters were used to dissolve the scrap which, in turn, was used in the magnesium production process.

The volume of soil estimated to exceed the 25 mrem/yr exposure limit for a subsistence farmer scenario is 890 yd^3.

4.4 AREA D

The soils contained within the Area D boundaries, approximately an area of 969 ft^2 (90 m^2), were evaluated in the RI by collecting intrusive samples from strategically placed borings and submitting the samples for laboratory testing of radiological parameters. Area D includes the soils along the south east portion of the site behind the warehouse. A number of samples were taken from this area both in 1996 and 2000. The 1996 samples defined an area where the SOR (1996) exceeded 1. This area contained no samples with a radium activity exceeding 27 pCi/g and was not addressed in the 1998 Removal Action. Fall 2000 activities for this area included a gamma walkover and four borings in the central part of the area. Figures 4.13 through 4.18 show the maximum detected radiological activity-concentration measured for each radionuclide in each borehole for both surface and subsurface soils. Table 4.1.d contains a summary of the data for this area.

Eleven of 19 samples analyzed for Ra-226 exceeded background in Area D. Th-230 concentration-activity measurements exceeded background for 10 of 19 samples and 9 of 19 U-238 concentration-activity measurements exceeded background. The maximum activity concentrations were 14.76 pCi/g, 20.70 pCi/g and 5.32 pCi/g for Ra-226, Th-230 and U-238 respectively. These maximums occur in SB0001, for Ra-226 and Th-230 and BH0067 for U-238.

No samples from below 2 feet exceed background for any of the three radionuclides.

The volume of soil estimated to exceed the 25 mrem/yr exposure limit for a subsistence farmer scenario is 160 yd^3.

4.5 AREA G

The soils contained within the Area G boundaries were evaluated in the RI by collecting intrusive samples from strategically placed borings and submitting the samples for laboratory testing of radiological parameters. Area G includes the soils between two old rail spurs south of the former Building 428.

Several samples were taken from this area in 1996 and one was taken northwest of the area in 2000. The 1996 samples defined a very small area where the SOR (1996) exceeded 1. This area contained no samples with a radium activity exceeding 27 pCi/g and was not addressed in the 1998 Removal Action. Fall 2000 activities for this area included a gamma walkover and the single borehole previously mentioned. Figures 4.1 through 4.6 show the maximum activity-concentration measured in each borehole. Table 4.1.e contains a summary of the data for this area.

Radium-226 analyses showed that 6 of 15 samples exceeded sitewide background. Six of 16 samples analyzed for Th-230 exceeded background as did 5 of 16 samples analyzed for U-238. The maximum concentration-activities for Ra-226, Th-230, and U-238 are 22.4 pCi/g, 13.5 pCi/g and 12.12 pCi/g, respectively. The Ra-226 value occurs in the upper 6 inches of BH0023 while the uranium occurs in the 6-12 inch sample from the same borehole. The Th-230 value occurs in SB0001, which is northwest of the main area identified by gamma walkover. Only one sample from below 2 ft exceeds background for any of the radionuclides. The 3.5-4.5 foot sample from BH0023 exceeds the U-238 background by 1.1 pCi/g.

The volume of soil estimated to exceed the 25 mrem/yr exposure limit for a subsistence farmer scenario is 40 yd^3.

4.6 AREA I

Area I is a small isolated area in the western portion of the site which appears to be unrelated to former Government operations. Although 9 of 14 samples exceed the background for Ra-226 and the maximum concentration-activity of 125.11 pCi/g is well above the 27 pCi/g excavation limit developed in the Feasibility Study (USACE 1998b), it was not excavated in 1998 due to time and weather constraints. With maximum concentration-activities of 304.2 pCi/g for Th-230 and 44.56 pCi/g for U-238 the area exceeds background. Nine of 14 Ra-226 analyses, 5 of 11 Th-230 analyses and 6 of 7 U-238 analyses exceed sitewide background. BH0047 contained the maximum Ra-226 and U-238 analyses while BH0001 contained the maximum Th-230 analysis. These boreholes are only about 1 m apart and both samples were collected at depths less than 1.5 feet. Gamma walkover data from both 1996 and 2000 has been used to define the surface boundaries of this area. Three samples from below 2 feet slightly exceed background for radium, thorium and uranium. Figures 4.1 through 4.6 and Table 4.1.f show and summarize the data respectively.

The volume of soil estimated to exceed the 25 mrem/yr exposure limit for a subsistence farmer scenario is 310 yd^3.

4.7 POST 1950 STRUCTURES

The magnesium production process shut down in the late 1950's and no scrap metal containing radionuclides was shipped to the site after 1953. However, construction of new buildings provided an opportunity for contaminated soils to be used as fill around structures. This impact was discovered during the 1998 excavations. Soil around the foundation of the pump house south of the butadiene tank was found to contain elevated levels of radionuclides exceeding the excavation criteria. These elevated levels were deeper than had been expected. Several structures are known to have been constructed since the 1950's. In addition to the previously mentioned pump house, Buildings 413, 414, and 415 were new as was the MDI/TDI transfer facility. Table 4.1.g contains a summary of the data for this area.

Very few of the samples in this IA had Ra-226, Th-230, or U-238 above background. Just 2 of 16 samples exceeded the Ra-226 background, and just one each of the Th-230 and U-238 analyses exceeded background. The 4 to 5 foot sample from SB0016 contains all the maximum concentration-activities. Maximum concentration-activities of 7.42 of pCi/g Ra-226, 3.73 of pCi/g Th-230 and 2.99 of pCi/g of U-

238 were found in this sample. This sample is east of the MDI/TDI facility on the fringes of Area C (Figures 4.13 through 4.18). It is likely that the levels found in this boring are the result of the acid digestion facility which probably caused the impacts to Area C rather than any impacted fill around the foundations of the MDI/TDI facility. For this reason it will be considered not as evidence of contamination in the Post 1950's backfill but with the rest of the samples from Area C.

Based on these findings no soil around the post 1950 structures appears to exceed the 25 mrem/yr. exposure limit for a subsistence farmer scenario.

4.8 RUBBLE PILE

The rubble pile is an area of the site south and east of the eastern rail spur that resulted from the excavation of material for the placement of a new storage tank. This material was surveyed using gamma walkovers in both 1996 and 2000. In addition soil samples were taken during both field efforts. Figures 4.13 through 4.18 show the maximum concentration-activity of each radionuclide detected in both surface and subsurface soils. Table 4.1.h contains a summary of the data for this area.

None of the 1996 sampling indicated an SOR (1996) above 1. However, the 2000 sampling, indicates that some material in the rubble pile exceeds background. Seven of 20 samples for Ra-226 and Th-230 exceed background as do 4 of 20 samples analyzed for U-238. The maximum Ra-226 concentration is 75.78 pCi/g at location SB-0012. The maximum Th-230 concentration (79.04 pCi/g) and the maximum U-238 concentration (21.96 pCi/g) also occur at the same location. All of the samples above background are at depths of less than 2.3 feet.

The volume of soil estimated to exceed the 25 mrem/yr exposure limit for a subsistence farmer scenario is 140 yd^3.

4.9 DOSE RATE MEASUREMENTS

General area dose rate surveys were performed and documented where the 2000 Gamma Walkover Survey had recorded the highest gamma activity detected at the Painesville FUSRAP Site (Area A and Area I). These measurements were determined to be a result of direct radiological contamination. Contact and 30 cm dose rate surveys were performed where a localized area of elevated activity may pose a significant external radiation exposure hazard. The contact measurements were only used to locate the areas where the 30 cm dose rate surveys were conducted. The site radiation protection manager (RPM) identified these areas.

Elevated radiological measurements were recorded in Area A near sample locations IAA-SB012 and IAA-SB034, and in Area I next to 1996 sample location BH0047. The dose rate measurements were as follows:

- Area A: 20 micro rem (μrem)/hr
- Area I: 40 μrem/hr

These dose rate measurements include the background of 7 μrem/hr. The Health Physics Logs and Records are compiled in Appendix D.

4.10 RADIOLOGICAL AIR MONITORING

Monitoring for ionizing radiation, radiological contamination, and airborne radioactivity was conducted to ensure that personnel exposures were kept As Low as Reasonably Achievable (ALARA), to verify radiological conditions, and for contamination control. Radiological monitoring was conducted in accordance with the following procedures detailed in the SAP (SAIC 2000b), Appendix B: HP-004 "Quality Control of Radiation Monitoring Equipment", HP-108 "Operation of Portable Radiation Survey Instruments", and HP-405 "Radiological Surveys".

Air monitoring was accomplished using breathing zone (lapel) particulate air sampling during intrusive activities. Air monitoring was conducted on individuals with the highest potential of inhaling radioactive material, when there was a potential for airborne radioactive material (as determined by the field Health Physics Technician). Contamination levels encountered during work were evaluated to determine the potential to generate airborne radioactive material. Results of the radiological air sampling are documented in Appendix D, Health Physics Logs and Records.

Air samples were analyzed for gross alpha and gross beta/gamma using a Ludlum 2929/43-10-1, or equivalent. Gross air sample activity was compared against the 10 CFR 20 Subpart E weighted Derived Air Concentration (DAC) value calculated in the SAP, Appendix B (Attachment H). Results indicate that all samples were less than the minimum detectible activity (MDA) of the radiation instrumentation of 5.7E-12 microcuries per milliliter (μCi/ml) and below the DAC value (1E-11 μCi/ml). Specifically, results ranged from 0.0 μCi/ml (no net measurement) to 2.5E-12 μCi/ml. These results indicate that very little, if any, airborne contamination was produced, even in the immediate vicinity of intrusive activities.

4.11 GROUNDWATER SAMPLING

Eight monitoring wells established by the current property owner were sampled for Ra-226, isotopic thorium and isotopic uranium. Both filtered and unfiltered samples were analyzed. The locations are shown in Figure 3.7. As shown in Table 4.2 most of the results are non detects (indicated by a U after the value). Only one sample shows any elevation that can not be explained by turbidity or analytical variability. The maximum Ra-226 value is 6.05 pCi/L in an unfiltered sample from a well south of Fairport Nursery Rd. (MW-29). The filtered sample was a non-detect. The maximum Th-228, Th-230 and Th-232 values are 4.12 pCi/L, 4.3 pCi/L and 4.03 pCi/L, respectively, all from the same unfiltered sample. All the filtered results for thorium are non-detects. The uranium data show the maximum results in MW-39. The maximum U-234 and U-238 results are 6.31 pCi/L and 3.77 pCi/L, respectively, for unfiltered samples and 6.14 pCi/L and 3.89 pCi/L for filtered results. All samples for U-235 were non-detects.

4.12 SUMMARY

This section provides a brief summary of the sampling results for the on-site soils. The on-site soils were investigated by focusing on features known or believed to have been impacted by past AEC activities at the site. These features include:

- Area A (property surrounding the former butadiene tank area)
- Area B
- Area C (includes West Fence Lonza Chemical Co. Property)
- Area D
- Area G
- Area I
- Post 1950 Structures
- Rubble Pile (southeast corner of the UCC property)

Three radionuclides (Ra-226, Th-230, and U-238) were the AEC-related COPCs above background levels in soil samples from the various operable units. The summary tables and findings are discussed for each of the IAs. In addition, maps showing the locations and concentrations of radionuclides detected above background for each IA have also been included in the preceding discussions. Site groundwater was investigated by sampling eight monitoring wells.

The most significantly impacted areas for the on site soils include Areas A, B and C. Radionuclides were detected above background at the other features investigated, but usually at much lower levels or in much smaller volumes. Detections above background at depths greater than a few feet were encountered in areas that had experienced post-1950's construction such as foundations. Contamination outside these areas is generally confined to the surface soils. All detects of radionuclides in groundwater were well below maximum contaminant levels (MCLs). The sample results do not indicate current impacts of MED/AEC constituents on groundwater.

Table 4.5 summarizes the volume and areal extent of radiological contamination interpolated at each of the investigation areas.

5.0 CONSTITUENT FATE AND TRANSPORT

This section identifies historic and current sources of MED/AEC related constituents, describes historic and current release and transport mechanisms, which will allow for the characterization of exposure to potential receptors identified in the Baseline Risk Assessment. A Fate and Transport model was developed in the Painesville Characterization Report (USACE 1998a). Subsequently, additional sampling and analysis have been performed providing information important to understanding fate and transport of constituents at the site. This section discusses the data and its effect on the fate and transport model for the site.

The source media are described in Section 5.1. The exposure pathways and receptors will be described in Section 5.3. This section describes the processes, both physical and chemical, affecting the migration of constituents at the Painesville site. The fate and transport of site contaminants become important when they have the potential to come in contact with ecological or human receptors through the transport pathways discussed in Section 5.3.

Section 5.2 describes constituent release and transport mechanisms currently occurring at the Painesville FUSRAP Site including erosion by wind and surface water, and leaching from soils to groundwater. In addition to these release mechanisms; historically, during magnesium processing operations leaks, spills, and dumping may have occurred. The conceptual model of release and transport mechanisms at the Painesville site is contained in a tabular presentation of the sources, release mechanisms, and exposure pathways (Table 5.1). The table identifies a number of source media and the exposure routes to which they may contribute.

5.1 SOURCE MEDIA

There is no known history of processing or production of radioactive materials at the Painesville site. The radioactivity present at the site resulted from the use of scrap ferrous metal to scrub chlorine gas released during the magnesium production process. The GSA received scrap ferrous metal from the AEC's inventories at the LOSA in Niagara Falls, New York. By the early 1950s, LOSA had accumulated significant quantities of scrap metal, in part because metal drums were used to ship and store residues from the processing of pitchblende ores. When the pitchblende residues were consolidated into a storage facility at LOSA, the emptied drums were cleaned for reuse or scrapped. These drums, which contained observable residues, were part of the scrap metal shipped to the Painesville site (ORNL 1991).

The primary source medium at the Painesville site is described below and in Table 5.1. Table 5.1 identifies a single source media that may have contained constituents from offsite MED/AEC operations. Since magnesium production operations at the Painesville site were discontinued in the early 1960s the source media and some of the release mechanisms described in Table 5.1 no longer occur at the site. They are discussed here to explain the current distribution of contaminants at the site and to project potential future releases. For the purposes of the fate and transport discussion, source media includes only scrap metal received from LOSA. Many of the site's source media (primary or secondary) have been contained at or removed from the site. Since the risk assessment addresses current and future site risk, the risk assessment will only consider constituents that may contribute to complete current and future exposure pathway. Although some source media no longer exist at the Painesville site, constituents present in the source media may have migrated to other media that are still present at the site. This report will examine the patterns of historic and current constituent migration at the Painesville site leading to the existing distribution of contaminants. The fate and transport analysis also will allow for future projection of constituent concentrations in site media.

Primary Source: Approximately 1,650 tons of scrap metal were shipped to the Painesville site. These shipments occurred in December 1951, July 1952, and April 1953, in the estimated quantities of 640 tons, 560 tons, and 450 tons, respectively (Hershman 1952, and Hershman 1953). The scrap metal was delivered by the FP&E rail line to the western side of the former Production Area where it was stored on the ground with no cover. Former employees indicated an additional delivery route also was present on the eastern side of the buildings, where scrap was moved from the west railroad siding to the east siding by sliding uncovered rail-sided wooden skids or sheds pulled by a tractor (Eddington 1996). A 2001 interview with the assistant plant manager indicated that the material was moved from the west side to the east using rail cars shunted along the sidings (Trumbel 2001). From the eastern side, the scrap metal was either immediately added to the HCl digester tanks or stored on the ground (ORNL 1990)

The scrap metal used to scrub chlorine gas was immersed in weak HCl for complete digestion. The acid oxidized the iron in the scrap metal and ferrous chloride was produced. Chlorine gas released during magnesium production was bubbled through the ferrous chloride solution and further oxidized the iron to form ferric chloride (ORNL 1990). The liquid acid waste was discharged directly into the Grand River from the 1940s until June 1952. Subsequent to 1952, a disposal system is believed to have been used to intercept the existing acid sewer and discharge the waste into an alkaline waste lake on the Diamond Alkali facility across the Grand River from the DMC property. The alkaline water neutralized the acid waste and produced calcium chloride and ferric hydroxide. The ferric hydroxide settled in the impounding basin while the calcium chloride was discharged into the Grand River (ODH 1952a). The bottom and sides of the alkaline waste lake were permeable, potentially allowing seepage to groundwater and surface water. Direct discharge of acid waste into the Grand River continued during system malfunctions and impound overflows (ODH 1952a and ODH 1952b). Investigation of the acid lines was completed in 1996 and showed no impacts by MED/AEC material. Waste lagoons between the Grand River and Fairport-Nursery Road were constructed after Uniroyal purchased the property in 1964 and therefore, would not have received MED/AEC waste.

Secondary Sources: After the evaluation of results from the characterization sampling, the only secondary sources are surface and subsurface soil. This soil was contaminated after receiving radionuclides from the radioactively contaminated scrap metal which may have been stored on it or from which contaminants were dislodged by wind or rain.

The investigation of the foundation fill around post 1950's structures indicated that only one area had contaminated material. During the construction of foundations in the vicinity of the BDE tank some surficial material had been used as backfill. This resulted in some deeper soil contamination than expected.

A number of buildings were demolished by UCC after the end of magnesium operations. The known rubble from these demolitions is in a filled area across Fairport nursery Road and in a pile in the southeast corner of the site. Both of these areas were investigated. Samples taken in 1996 indicated only low levels of radionuclides in the rubble and soil across Fairport Nursery Road which is not in an area ever owned by the Government or used by the Government for disposal activities. The pile next to Area D was sampled in both 1996 and 2000 and is considered as a part of the soil volume being investigated.

Surface water and sediments sampled during the 1996 field effort showed no elevated radionuclide concentrations. Groundwater below the upper perched water table was not sampled. The SESOIL computer program was used to model the transport of COCs from the shallow soils to confirm that the deeper water table will not be impacted by COCs detected in the former Production Area. In 2001, groundwater sampling confirmed that there are no current impacts by AEC COCs.

Inputs to the SESOIL program were taken from the characterization report (USACE 1998a) and from literature. They are shown in Tables 5.2 and 5.3 and results from the modeling are in Table 5.4. The results show that migration of the radionuclides through the clays and silts would be very slow: roughly 30 cm (1 ft) in 1000 years for Ra-226 and Th-230 and 374 cm (12 ft) in 1000 years for U-238.

The inputs assume the worst case scenario of the maximum concentration of each radionuclide at the top of the clay (already through the fill) and the lowest distribution coefficient (Kd) for each radionuclide.

5.2 CONSTITUENT RELEASE AND TRANSPORT MECHANISMS

The primary source of the radiological COCs at the Painesville site was determined to be the scrap steel transported to the site from LOSA. This steel was used in magnesium production operations to scrub chlorine gas generated during the magnesium production process. Since the barrels used for scrap metal were reported to contain residues of uranium ores, it is likely that radioactivity was transferred to the soil in areas where the scrap metal was stored by being dislodged during handling or by being washed off by rain. The primary release mechanisms for the radiological COCs included releases that may have occurred:

- during off-loading at the site, or when the scrap steel was moved from storage piles to process areas,
- during storage of scrap steel onsite (i.e. rain or wind transporting the COCs away from the pile), and
- during magnesium production processes.

Potential secondary sources of COCs include the soil along transportation corridors and/or at storage areas. Other secondary sources may have included building surfaces, and possibly pipes used to transport acid wastes to discharge points. With the exception of soils identified in Section 4 the other secondary sources have been eliminated by evaluation of the results of the 1996 characterization (USACE 1998a).

The secondary release mechanisms included: site operations which generate dust; storm water runoff, erosion and deposition; infiltration and percolation; dissolution and suspension; over-topping dikes; and discharges to (or leaks in) drains and sumps.

Transport mechanisms are the environmental processes that facilitate the movement of constituents. The primary transport mechanisms affecting the migration of constituents within and away from the Painesville site include wind transport, surface water runoff, infiltration, and groundwater flow. The release mechanisms identified above have acted upon the source media identified in Table 5.1 increasing constituent mobility and enabling constituents to migrate from their original source media to the adjacent media, e.g., from buried sludge to subsurface soils.

The following discussion provides a general description of the release and transport mechanisms operating at the Painesville site. The primary source of the radiological COCs at the Painesville site was determined to be the scrap steel transported to the site from LOSA. Since this material no longer exists at the site, release mechanisms acting upon this source are discussed only from a historic perspective.

5.2.1 Wind Erosion

Constituents present as vapors, adsorbed to soil or as particles in soil that may be released as particles transported by wind as airborne dusts or vapors. When vapors or particles enter the atmosphere, they may be subject to wind-borne transport causing the dispersal of constituents to other on and off-site areas. This mechanism can result in a broad distribution of site-related constituents.

Wind erosion is more likely to occur in areas without man-made cover or with sparse vegetative cover. Site constituents such as radiological constituents may be eroded from impacted areas and be transported to areas downwind of the source areas. Due to extensive vegetative and pavement cover, wind erosion is believed to be a minor release mechanism of concern at the Painesville site, and this has been confirmed through air sampling that was discussed in the Characterization Report (USACE 1998a).

During the recent demolition activities at the site, the areas of concern were roped off so that impacts to the radiologically contaminated soil were minimized.

5.2.2 Surface Water and Runoff Erosion

Surface water runoff following a rain or snowmelt event may erode soil bearing site-related constituents and carry constituents in runoff water. Surface runoff from the Painesville site flows generally westward from the center of the site and south across the eastern part of the former Production Area. Most surface water runoff is intercepted by storm drains which exit the site to the south and eventually drain into the Grand River. There are no surface ditches or streams leaving the site. Movement of potentially contaminated surface soil and sediment to surface drainage via water runoff and erosion appears to be an inactive transport mechanism at the Painesville site. As discussed in the characterization report (USACE 1998a) no evidence of contamination has been measured in surface water runoff or sediment samples collected from on-site or offsite including samples taken from the Grand River. No changes in the site contours, which would impact the migration of surface water and sediment, have occurred since the 1996 sampling.

5.2.3 Infiltration, Dissolution, and Groundwater Flow

Precipitation falling on the Painesville site may run off or may return to the atmosphere through evaporation or through plant uptake and evapotranspiration. Precipitation also may infiltrate into soil, where it could remain fixed in the unsaturated vadose zone soils or percolate to the water table. Water percolating through contaminated soil can result in the dissolution of water-soluble compounds that eventually reach the groundwater. Although the principle contaminants at the Painesville site (e.g. radiological constituents) are not very soluble or readily mobile, it is possible for transport of contaminants to groundwater to occur.

The mean annual precipitation for Lake County is 36 inches per year with annual runoff of 11 inches per year and an evapotranspiration rate of about 25 inches per year (Hanson 1991). Very little rainfall is available for groundwater recharge. The state of Ohio actually calculates that the net water loss (precipitation – runoff) is 22 inches per year. Due to the site's flat topography, precipitation not collected by storm drains tends to collect on the surface, eventually either evaporating or percolating into the shallow soil. Investigations revealed that a shallow perched layer of saturation does occur seasonally down to depths of about 5 ft (USACE 1998a).

The migration of contaminants through the unsaturated zone is dependent on the recharge to the aquifer, the properties of the soil and the particular contaminant. One method of determining the impact of contaminants on the groundwater aquifer is to model the movement of that contaminant using the SESOIL model. This model allows the determination of the speed of contaminants migrating from their current position to the aquifer. A SESOIL model of radionuclide migration using as much site-specific data as possible has been run for the Painesville site and is reported in Section 5.1.

5.2.4 Leaks, Spills and Dumping

Liquid acid waste from DMC was discharged directly into the Grand River from the 1940s until June 1952. Subsequent to June 1952, a disposal system may have been used to intercept the existing acid sewer and discharge the waste into an alkaline waste lake on the Diamond Alkali facility across the Grand River from the DMC property. The alkaline water neutralized the acid waste, producing calcium chloride and ferric hydroxide. Ferric hydroxide settled in the impounding basin while calcium chloride was discharged into the Grand River (ODH 1952a). Direct discharge of acid waste into the Grand River continued during system malfunctions and overflows (ODH 1952a and ODH 1952b). Waste lagoons between the Grand River and Fairport-Nursery Road were constructed by UCC after they purchased the property in 1964 and would not have received MED/AEC waste. Sediments from the Grand River downstream of the current outfall and the pre-1952 outfall have been sampled and show no evidence of radionuclides above background (USACE 1998a).

5.3 PHYSICAL AND CHEMICAL CHARACTERISTICS OF ENVIRONMENTAL MEDIA AND CONSTITUENTS

The physical and chemical characteristics affecting the fate and transport of constituents through and among environmental media are discussed in this section. Emphasis is placed upon those characteristics and processes most likely to influence the movement of the contaminants identified at the Painesville site. The general information on chemical characteristics is summarized (Section 5.3.3) from published sources (EPA 1979, Dragun 1988, Knox et al. 1993).

5.3.1 Soil Characteristics

The soil factor that most affects the relative amount of precipitation that may infiltrate or run off the surface is soil permeability. Soil permeability is the most important physical characteristic that controls the movement of water and constituents through soils. This is true for both surface and subsurface soils. Soil permeability is a measure of the ability of soil to permit water to pass through. Geotechnical data presented in Section 4 show that the soil permeability is low, thus inhibiting the movement of groundwater.

The chemical characteristics most likely to influence constituent movement are cation exchange capacity (CEC), pH and organic carbon content. The CEC of a soil is a measure of its capacity to adsorb positively charged ions, such as radionuclides, by electrically attaching these ions to the surface of soil particles. Cation exchange specifically refers to the exchange between cations balancing the charge on the soil particle and the cations moving through a soil. The capacity of a soil to adsorb ions is greatly influenced by the surface area of the soil particles, because ions are attracted to the exposed mineral surfaces. Clay particles have a large surface area compared to sand grains, and can adsorb cations within their layered structures to a greater or lesser degree depending on the clay minerals present. The CEC of a typical clay-rich soil may be 2 to 30 times higher than the CEC of a typical sandy soil (Dragun 1988). Soil with high clay content (and a correspondingly high CEC value) can be expected to slow the movement of dissolved ions more readily than a clay-free soil. Geotechnical data collected in the summer of 2000 show the soil to be predominantly a silty clay, clay or silt with 80% or more fines.

The pH of a soil is a measure of the 'acidity'. A lower pH represents a more acid environment and one in which metals are more mobile.

The amount of naturally-occurring organic carbon present in soil also affects the adsorption of metals and organic compounds. In general the organic carbon content of a clay will be higher than that of a sand. The presence of organic material in soil tends to increase the retardation of radionuclides.

5.3.2 Groundwater Characteristics

The primary factors influencing groundwater transport are described here. The mobility of a constituent in groundwater is determined by the properties of the constituent as well as by chemistry of the groundwater. The pH and redox potential of groundwater are important factors in the fate and transport of constituents because they control the ability of groundwater to dissolve and mobilize metals and other constituents.

The behavior of ionizable constituents in groundwater, such as metals, is greatly influenced by pH which is a measure of the relative acidity of the groundwater. Because the ionized and neutral species of such constituents have different sorption coefficients, fate and transport models must account for pH to accurately predict the transport of ionizable constituents in groundwater.

The redox potential is a numerical index of the intensity of oxidizing or reducing conditions in groundwater. The redox potential is useful in predicting which chemical reactions involving electron transfer are likely to occur in groundwater.

5.3.3 Physical and Chemical Characteristics of Constituents

Historical information regarding activities at the site indicate that the principle contaminants at the site are radionuclides. Sampling results from the 1996 and 2000 characterizations have confirmed the presence of radionuclides. Other contaminants are present but in this focused RI/FS, FUSRAP is only authorized to address the radionuclides and constituents mixed with the radionuclides.

Radionuclides: Radium, thorium, and uranium occur naturally in geologic materials. All are relatively insoluble in water in their pure forms, but form soluble compounds in reactions with humic acids and other organic matter in soils and sediment. In general, uranium is the most mobile and radium the least.

5.4 CONCLUSIONS

Data presented in the 1998 characterization report and new data collected in 2000 indicate that radionuclides are confined to the surface and subsurface soils of the Painesville site. Sampling of air, surface water and sediment show no elevated levels of radionuclides migrating from the site. Modeling presented in Section 5.1 indicates that they should not be migrating quickly to groundwater.

6.0 BASELINE RISK ASSESSMENT

The objective of this BRA is to provide an analysis of baseline human health risks associated with the Painesville site. Screening for ecological risks at the site is also presented in this section. The human health and ecological risks will be used in conjunction with ARARs and other requirements that are necessary to be considered in order to determine the need for remedial action at the Painesville FUSRAP site.

The risk assessment, along with ARARs, will provide a basis for determining the concentrations of radiological constituents that can remain on site and still be adequately protective of human health and the environment. The human health risk assessment (HHRA) and the ecological risk assessment (ERA) were conducted according to the methodology presented by the EPA in the *Risk Assessment Guidance for Superfund* (RAGS) and other guidance documents. This BRA evaluates only radiological constituents. The HHRA for radiological constituents presented in Section 6.3 utilized the RESidual RADiation (RESRAD) computer code Version 6.2. Although cancer slope factors are defined differently for radiological and non-radiological constituents, in general, the RESRAD code uses the same equations as those listed in RAGS. Exceptions include units for constituent concentration (e.g., pCi/g instead of mg/kg), the addition of the external radiation pathway, and the exclusion of the dermal contact pathway. The BRA includes an assessment of the non-carcinogenic properties of radionuclides when appropriate.

As a final step in the assessment, a list of site-specific Remedial Action Objectives (RAOs) is presented covering a range of potential cleanup goals for each COC. Radiological dose-based values are presented for comparison to regulatory limits that tend to focus on radiological dose.

6.1 METHODS USED FOR THE BASELINE RISK ASSESSMENT

The methods used for this BRA were initially proposed in the Painesville Project Work Plan for the Focused Remedial Investigation/Feasibility Study (SAIC 2000a). The Work Plan presented methodologies for conducting the HHRA and screening ERA for MED/AEC radiological constituents. These methodologies have been utilized to ensure that the objectives of the BRA will be met.

The HHRA for radiological contaminants in soil was conducted utilizing the RESRAD computer code Version 6.1. While estimating radiological risks with RESRAD uses methods consistent with those presented in the RAGS, the RESRAD code presents several advantages over standard RAGS methods including the following:

- RESRAD models future conditions, taking into account source removal by radiological decay, leaching, erosion, and radiological in-growth;
- RESRAD considers site-specific variables, such as rainfall, or soil density, that may impact results;
- RESRAD considers source geometry, taking into account the thickness and surface area of soil contamination;
- RESRAD is an integrated code that accounts for all potential exposure pathways with a single calculation or "run"; and
- RESRAD provides both carcinogenic risk and radiological dose estimates for comparison to appropriate regulatory limits.

RESRAD contains a model that estimates the risks from radionuclides leaching into groundwater from soil. However, since more site-specific information was available for SESOIL modeling, the SESOIL model was used. SESOIL modeling demonstrates that it is highly unlikely that MED/AEC constituents would ever reach groundwater. RESRAD modeling confirmed this finding. Despite this finding, exposure to groundwater was included in the subsistence farmer exposure scenario. Additional groundwater sampling also was conducted in 2001. The results of this sampling, which showed no impacts to groundwater, are summarized in Section 4.0.

The methodology for evaluating risk from radiological constituents in all media presented in this HHRA is organized as follows:

- Section 6.1 presents a brief description of the Painesville site and methodologies used for the HHRA,
- Section 6.2 provides the criteria that were used to evaluate and screen the Painesville site data and determine the radiological COPCs that were evaluated in the HHRA;
- Section 6.3 defines land use assumptions and receptors identified by the Exposure Assessment;
- Section 6.4 presents the methodology and guidance used to perform the radiological toxicity assessment;
- Section 6.5 presents the methodology used to conduct the risk characterization for radiological constituents;
- Section 6.6 outlines the criteria and guidance used to evaluate the uncertainties associated with the radiological HHRA;
- Section 6.7 identifies COCs and develops action levels for the Painesville site.

Background screens for detected radionuclides in each exposure unit (EU) are presented in Tables 6.1 through 6.8. Note that while the HHRA focuses on risk-based criteria, radiological dose-based limits have been proposed for the site. The two primary differences in risk and dose estimates include the following:

1) Risks are presented as lifetime estimates while doses are yearly estimates; and
2) Cancer slope factors (CSFs) convert an exposure to risk (e.g., risk per pCi uptake), while dose factors convert an exposure to radiological dose (e.g., mrem/yr per pCi uptake).

Otherwise, risk and dose calculations are identical. The RESRAD code simultaneously calculates risk and dose for comparison against appropriate limits.

The RESRAD code was run using site-specific parameter values, when available. When site-specific data were not available, values recommended or otherwise employed by EPA or the State of Ohio were used. Failing this, RESRAD defaults or values recommended in supporting documentation were utilized. Pathway-specific default parameters for the RESRAD code were established by Argonne National Laboratories (Yu, et al. 1993a, 1993b). Units for constituent concentrations were expressed as pCi/g. Some of the key RESRAD input parameters are presented in Table 6.9. When site-specific information was lacking, RESRAD input parameters were set at "reasonable maximum exposure" levels or left at RESRAD default levels.

All radionuclides are identified as carcinogens. Some radionuclides like uranium are also known to have non-carcinogenic hazardous properties when ingested or inhaled (e.g., uranium is a kidney toxin independent of radiological characteristics). The focus of Section 6.7 is to assess baseline risk and present RAOs for radionuclides based on their carcinogenic properties only. However, an assessment of the non-carcinogenic properties of uranium is also presented in this section. The non-carcinogenic risk of uranium was addressed separately from radiological risk.

A detailed site history and description are provided in Section 2.0 of this report. This information can be reviewed to provide background information on current exposure conditions.

6.1.1 Data Collection and Evaluation

Data collected during previous investigations, including a Preliminary Site Survey (ORNL 1990), a Radiological Characterization Survey (ORNL 1991), and the Characterization Report for the Painesville Site (USACE 1998a), was evaluated to determine usability for the risk assessment.

Only historical data that met the DQOs set forth in the QAPP were used in the HHRA and screening ERA. Sample results from the RI were verified and validated using the methodology described in the QAPP.

All available and appropriate sampling data was compiled for use in the risk assessment. Newer data was used to supplement rather than supercede older data except where older data describes materials that have subsequently been removed from the area such as soils removed from Area A. In this case, the older data no longer represents site conditions and was not used in the risk assessment.

Site-specific background data were used in the remedial investigation to evaluate the nature and extent of radiological contamination and in the risk assessment to select human health and ecological COPCs. Background consists of naturally-occurring constituents and constituents present as a result of human activities unrelated to the Painesville FUSRAP Site operations. Background samples were collected of ambient air, soil, surface water, sediment, and background radiation over the land surface and in buildings. Background earthworm samples were collected for evaluation of potential ecological impacts. Results of the background sampling were presented in the Characterization Report for the Painesville Site (USACE 1998a).

6.2 IDENTIFICATION OF CONSTITUENTS OF POTENTIAL CONCERN (COPCS)

Preliminary COPCs were identified in the Characterization Report for the Painesville Site (USACE 1998a). However, the risk assessment for the Painesville FUSRAP Site was not limited to the preliminary set of radionuclides identified in the Characterization Report. The BRA evaluated those radionuclides associated with MED/AEC-related contamination including radionuclides from the uranium, thorium, and actinium decay series. The following sections summarize the process used to identity COPCs for the Painesville site.

The COPC assessment process includes an evaluation of site data including data screens designed to eliminate non-MED/AEC-related radionuclides or radionuclides that do not pose an unacceptable risk/hazard to human health. Two data screens were used: a background screen and a weight-of-evidence screen. The background screen was used to screen against naturally occurring radionuclides. Weight of evidence screening considered frequency of detection and screening based on secular equilibrium. Although risk-based PRGs are now available for radionuclides given the generally high risk levels posed by background levels of radionuclides from the uranium and thorium series, a background screen was considered to be more appropriate than a risk-based PRG screen. Radionuclides that passed through these screens were designated as COPCs and were included in site-specific risk calculations. Therefore, radionuclides underwent a background screen and weight-of-evidence screen but not a level risk-based screen to identify COPCs. COPCs that are estimated to pose an unacceptable risk/hazard will be identified as COCs.

The COPC selection criteria discussed below were applied to detected constituents by EU and by media in Tables 6.1 through 6.8. The COPC screening tables provide information on the frequency and magnitude of radionuclide detection at the site and presents the rationale for selection of the COPCs. The same COPCs were utilized for current and future exposures.

6.2.1 Initial Data Reduction

The data set used in the risk assessment included sample results verified and validated using methodology described in the QAPP. Data collected during previous investigations were evaluated to determine the usability of data for the risk assessment; only historic data that met the DQOs set forth in the QAPP were used in the risk assessment.

COPCs at the Painesville site are members of the naturally occurring uranium, thorium, and actinium decay series, as shown in Figures 6.2, 6.3, and 6.4 [decay series for U-238, uranium-235 (U-235), and Th-232, respectively]. Because CSFs are available only for radionuclides with half-lives of six months or longer, the primary list of potential radiological constituents includes only the long-lived radionuclides in these series (short-lived decay products are included in slope factors for long-lived radionuclides so they need not be included separately, because it has been over 40 years since the material was deposited no MED/AEC related shortlived radionuclides without parents could be present.) The list of long-lived radionuclides includes U-238, uranium-234 (U-234), Th-230, Ra-226 and Pb-210 from the uranium series; Th-232, Ra-228 and Th-228 from the thorium series; and U-235, protactinium-231 (Pa-231) and actinium-227 (Ac-227) from the actinium series. Pb-210 was assumed to be in equilibrium with Ra-226, its closest long-lived parent. Since only radionuclides from the uranium, thorium, and radium series are likely to be MED/AEC-related, other radionuclides which are ubiquitous in the environment (e.g., americium-241, potassium-40 and cesium-137), or are statistical anomalies of spectral analyses, were screened out using the COPC data screens. Long-lived radionuclides were measured directly, if possible, and the dose assessment used the 95% upper confidence level (UCL) on the mean as a conservative estimate of site concentrations.

The Painesville site database includes results obtained through various analytical methods, sometimes producing multiple entries for a single sample and radionuclide. Because of the multiple analytical methods and the established relationships between radionuclides in decay series, all data were not used at face value in risk calculations. Instead, a series of tests was performed to refine the data set so that each sample contained a single result for each radionuclide. Site data were refined using the criteria described below:

- Many samples were analyzed by both alpha spectrometry and gamma spectrometry. Because the detection limits and analytical errors are lower for alpha spectrometry, this method was used preferentially to estimate the source term. This primarily impacted the Th-230 values where detected alpha spectroscopy values were much lower than the detection limits for gamma spectroscopy.
- In a decay chain that includes a number of sequentially transforming isotopes, the quantitative relationship among the various members of the decay series is of great significance. With the passage of time, the activity concentrations of the decay products will equal the activity concentrations of the parent nuclides. This phenomenon is known as equilibrium. When the parent nuclide has a half-life much longer than the decay products [such as with U-238 and the decay products thorium-234 (Th-234) and protactinium-234 (Pa-234)], the equilibrium condition is called secular equilibrium. Results for parent radionuclides are sometimes reported in addition to results for short-lived decay products. Often the parent/decay product results are presented separately although the values are identical, or the wrong method was listed for a decay product. To eliminate this duplication and/or mislabeling, the parent radionuclide result was used for decay products and equilibrium conditions were assumed.

- Since it has been 50 years since the AEC materials were brought to the site, no short-lived radionuclides associated with MED/AEC activities could be present without a parent. Therefore, short-lived decay products with no parent to support in-growth were excluded from the risk assessment.

This approach simplified the source term calculation process by eliminating extraneous information and improved the overall quality of the data set used in risk calculations. A complete list of COPCs for each of the Painesville EUs is presented in Table 6.1 through 6.8. This list includes only members of the uranium, thorium, and actinium decay series as expected based on site process history.

6.2.2 Background Screening

Background data measured in soil samples collected from the Painesville Township Park were used to evaluate the nature and extent of contamination in various site media and to select human health and ecological COPCs. Office of Solid Waste and Emergency Response (OSWER) Directive 920.4-31 provides a table that summarizes information from the Hazard Ranking System (55 FR 51532, December 14, 1990) and states that 2 standard deviations above the mean or the 95% UTL may be used for radionuclides present in natural background. The COPC screening used media-specific background criterion defined as the upper 95% UTL.

The background data set for the Painesville site did not include results for either U-234 or Pb-210. U-234 was assumed to be present at the same activity concentration as U-238 based on the principal of secular equilibrium. For the background screening of COPCs, based on the activity ratios for natural uranium, alpha spectroscopy results for U-238 in background were used to screen U-234. For the same reasons background values for Ra-226 were used to screen Pb-210.

6.2.3 Weight-of-Evidence Screening

Because of problems inherent in applying a single statistical tool to data sets that have different characteristics, an additional screening step was applied to the data after they were screened against background concentrations. This screening step is referred to as a weight-of-evidence screening. In weight-of-evidence screening multiple types of evidence were considered to determine whether a constituent is MED/AEC-related or naturally occurring. The following weight-of-evidence screening techniques were used to further evaluate COPCs.

Constituents detected in less than five percent of the samples (i.e., less than one in 20 samples) from a given medium in any one EU were eliminated as COPCs, unless their presence was expected based on historical site information or was indicative of the existence of a 'hot spot' (EPA 1989). Because the UTL represents the 95th percentile of the data (not the full range), it is possible to observe occasional hits above the UTL that are still within the range of background. A review of analytes with a low frequency of detection above the background criteria was performed. If a single detection was greater than the UTL or the constituent was detected at levels only slightly above the background screening value, the constituent was evaluated as to whether it is significantly above background or within the expected range of variation of the data set.

Although long-lived radionuclides from the thorium decay series include Th-232, Th-228 and Ra-228, the Painesville characterization data set includes fewer analytical results for Ra-228 than for Th-232 or Th-228. In some cases, the smaller data set for Ra-228 indicated that Ra-228 should be not be carried forward as a COPC even though Th-232 and Th-228 were retained as COPCs. Since MED/AEC activities ceased at the Painesville site over 30 years ago it was assumed that all three long-lived radionuclides in the thorium decay series are present in secular equilibrium. In other words, it was assumed that all of the decay products in the thorium decay series are present at approximately the same concentration as the Th-232 parent. Therefore, when Th-232 and Th-228 were retained as COPCs, Ra-228 was retained on a weight-of-evidence basis. When just one of the three thorium decay series radionuclides was above background, a weight-of-evidence approach was used to determine whether all three radionuclides should be screened out. When retained, measured activities were used for the dose assessment for all three radionuclides.

Several miscellaneous radionuclides were reported in the final Painesville data set (e.g. europium-152, niobium-95 and promethium-146). These radionuclides are not normally associated with uranium processing operations. These radionuclides are most likely anomalies and were probably not truly detected given their short half-lives and history of the Painesville site. These radionuclides were detected in a small fraction of the samples (less than 1 to 3 percent of all samples) so they were not carried through the BRA.

6.3 EXPOSURE ASSESSMENT

The exposure assessment for the Painesville site evaluated potential risk for all receptor populations reasonably anticipated to be exposed to COPCs. The exposure assessment was performed in two steps. Potentially complete exposure pathways between constituent sources and potential receptors were identified first. In the second step of the exposure assessment, exposure point concentrations (EPC) for each receptor resulting from contact with contaminated media were assessed. Identification of potentially complete exposure pathways was accomplished by the following:

1) identifying current and potential future on-site and off-site receptors;
2) identifying media through which constituents may come in contact with the receptors, including soils, groundwater, sediment and surface water, and air; and
3) identifying the routes of exposure or pathways through which the receptors may be exposed (i.e. ingestion, dermal contact, and inhalation).

Current and projected future land use within the boundaries of the Painesville site is industrial. However, manufacturing operations at the facility have ceased and the site is currently in a state of transition. Surrounding land use includes both industrial and residential use. Although continued industrial use is anticipated at the Painesville site, the HHRA included industrial, residential and subsistence farmer exposure scenarios. The conceptual site model, Figure 6.1, shows potential source media and constituent migration pathways for all media.

In order to quantify exposure for each receptor, an EPC, or a high-end estimate of the constituent concentration a receptor may come in contact with over the duration of exposure, was estimated as the 95% UCL. If the 95% UCL was found to be greater than the maximum detected concentration for a particular COPC, the maximum concentration was used as the EPC rather than the 95% UCL. Potential risks for all COPCs at their respective EPCs were quantified for all identified receptors using high-end or reasonable maximum exposure (RME) scenario exposure assumptions. The general equations used to quantify exposure to contaminated media at the Painesville site are presented in Section 6.3.3.

6.3.1 Characterization of Potentially Exposed Populations

The 1996 Gamma Walkover Survey of the Painesville site identified 11 areas with elevated gamma activity levels relative to gamma readings from three off-site background areas. Procedures used for the 1996 Gamma Walkover Survey are detailed in the Characterization Report (USACE 1998a). Using the 1996 Gamma Walkover Survey results, areas with 2.5 times background gamma activity levels, or greater, were contoured and used to define investigative areas and to focus additional soil sampling activities (USACE 1998a). Out of the original 11 investigative areas identified during the 1996 Gamma Walkover Survey, 8 IAs were retained for further characterization in the risk assessment. For the purposes of the risk assessment the 6 remaining IAs and 2 other areas were designated as EUs. EUs for the Painesville site were defined based on data collected on-site and off-site, on observed or assumed patterns of receptor behavior, and on conformity for use in the HHRA and ERA. EUs are areas over which a receptor is likely to average his or her exposure. EU's characterized in the BRA include:

Exposure Unit 1	Investigative Area A,
Exposure Unit 2	Investigative Area B,
Exposure Unit 3	Investigative Area C,
Exposure Unit 4	Investigative Area D,
Exposure Unit 5	Investigative Area G,
Exposure Unit 6	Investigative Area I,
Exposure Unit 7	Post-1950 Structures, and
Exposure Unit 8	Rubble Pile.

Three receptor scenarios were evaluated for on-site exposures under current and future land use scenarios. Assuming that the property is maintained as an industrial property, current and future exposures were evaluated for an industrial worker receptor. Based on surrounding land use, a future on-site resident receptor also was evaluated. A hypothetical future on-site subsistence farmer was also evaluated. Although a construction worker may be exposed during site transition this scenario was not evaluated because it is not considered as conservative as the industrial worker due to the duration of exposure. Cleanup levels based on the subsistence farmer scenario represent unrestricted release for MED/AEC constituents.

6.3.2 Identification of Exposure Pathways

The elements necessary to construct a complete exposure pathway and to develop the conceptual site model include the following:

- sources (i.e., contaminated environmental media),
- constituent release mechanisms,
- constituent transport routes,
- receptors, and
- exposure pathways.

Receptors may be exposed to constituents through direct contact with site media, or as the result of chemical migration away from the source into other media. Direct contact pathways represent exposure via direct contact with the source media. Source media for the Painesville site include surface and subsurface soils.

Under the industrial exposure scenario it was assumed that workers could be exposed to soil 0-2 ft bgs through incidental soil ingestion, inhalation of dust, and direct external gamma exposures. While on site, the industrial worker was assumed to spend 7 hours per day indoors and 2 hours per day outdoors (to be conservative), 250 days per year for a total of 25 years (EPA 1991). This worker was assumed to be exposed through incidental ingestion of on-site soil at a rate of 18.25 grams/year and inhalation of dust (EPA 2000). It was assumed that the worker breathes at a rate of 7,300 m^3/yr (20 m^3/day) while on-site, with an average dust loading of 0.0001 g/m^3 (EPA 1991 and Yu et. al 1993a). The surface water sediment and groundwater pathways are incomplete for this recipient since there is no consumption of groundwater and since no AEC related contaminants have been identified in the surface water and sediments. A summary of key RESRAD parameter assumptions for the industrial worker is presented in Table 6.9.

Under the hypothetical future case the on-site resident was assumed to be exposed to soil 0-10 ft bgs through incidental soil ingestion, inhalation of dust, and direct external gamma exposures. While on site, the resident was assumed to spend 16.4 hours per day indoors and 2 hour per day outdoors, 350 days per year for a total of 30 years (EPA 1991). It was assumed that the resident would be exposed through incidental ingestion of on-site soil at a rate of 36.5 grams/year (Yu et. al 1993b) and through inhalation of suspended dust. It was assumed that the resident would breathe 7,300 m^3/yr (20 m^3 per day) while on-site, with an average dust loading of 0.0001 g/m^3 (EPA 1991 and Yu et. al 1993a). The site has access to city water and it is assumed this will be used by the future resident thus making the groundwater pathway incomplete. No contaminants have been identified in the surface water and sediments so this pathway is also incomplete for the future resident. A summary of key RESRAD parameter assumptions for the future resident is presented in Table 6.9.

Under the hypothetical future case the on-site subsistence farmer was assumed to be exposed to soil 0-10 ft bgs through incidental soil ingestion, inhalation of dust, and direct external gamma exposures. The subsistence farmer was assumed to spend 16.4 hours per day indoors and 7.3 hours per day outdoors, 350 days per year for a total of 30 years (EPA 1991). It was assumed that the subsistence farmer would be exposed through incidental ingestion of on-site soil at a rate of 36.5 grams/year (Yu et. al 1993b) and through inhalation of suspended dust. It was assumed that the subsistence farmer would breathe 7,300 m^3/yr (20 m^3 per day) while on-site, with an average dust loading of 0.0001 g/m^3 (EPA 1991 and Yu et. al 1993a). In addition to these exposure routes it was assumed that the subsistence farmer would be exposed to site contaminants through the ingestion of vegetables, meat, and milk raised or collected on site. Although the potential for site contaminants to reach groundwater is rather low, it was assumed that the subsistence farmer would utilize groundwater for domestic and agricultural purposes. As indicated in Figure 6.1 although the surface water/sediment and groundwater pathways were evaluated for this scenario no COPCs have been identified. A summary of key RESRAD parameter assumptions for the subsistence farmer is presented in Table 6.9.

Previous site investigations included characterization of surface water and sediment samples from all on-site drainage routes. No radiological contamination was detected in surface water and sediment samples above background levels. The potential for soil contamination to reach groundwater in the future was evaluated using the SESOIL groundwater model. Even though SESOIL modeling showed that impacted soil at the Painesville site is isolated from potential groundwater drinking supplies (Section 5) the groundwater pathway was evaluated for the hypothetical future subsistence farmer scenario. For the BRA it was assumed that the subsistence farmer would utilize groundwater for domestic and agricultural purposes. The radon pathway may also be modeled by the RESRAD code. However, risk from exposure to radon was not estimated given the large uncertainty of the model and the fact that guidelines for exposure to radon are not based on risk or dose.

Exposures were estimated using standard exposure equations and standard parameter values identified for various exposure conditions. For this exposure assessment, intake variables for given pathways were selected to estimate the RME conditions. The RME is the maximum exposure that is reasonably expected to occur at the site and represents a conservative estimate of exposure.

Geotechnical parameters such as distribution coefficients and hydraulic conductivity were measured during the 1996 characterization effort. All relevant parameters were considered for use in RESRAD. Whenever a range of values was available for a given parameter, the more conservative value was generally used. When measured values were not available or varied greatly, the RESRAD software default values were used. Several of the model inputs were based on EPA recommendations for the reasonable maximum exposure scenario. The preference was to use site-specific data first, use values recommended or otherwise employed by EPA second, and use RESRAD defaults last. The following table lists some exposure unit specific input parameters used in the RESRAD run.

Exposure Unit	Area (meters^2)	Thickness of Contamination (meters)
Exposure Unit 1 - Area A*	2489	1.7
Exposure Unit 2 - Area B	930	1.7
Exposure Unit 3 - Area C	1357	1.7
Exposure Unit 4 - Area D	403	1.1
Exposure Unit 5 - Area G	121	1.4
Exposure Unit 6 - Area I	533	1.7
Exposure Unit 7 - Post 1950 Structure	960	1.7
Exposure Unit 8 - Rubble Pile	281	0.5

* Approximately 50 percent of Area A was excavated and is now under 0.7 meters of soil cover.
These represent contaminated areas except for EU 7 which is total area since there is no contamination in EU 7.

6.3.3 Quantification of Exposure Point Concentrations and Pathway Specific Intakes

In order to quantify exposure to each receptor, an EPC, or the estimate of the constituent concentration a receptor is likely to come in contact with over the duration of exposure, was calculated. For all calculations non-detect data was replaced by a value of one half the detection limit. The 95% UCL of the arithmetic mean was calculated according to the guidance provided in the *Supplemental Guidance to RAGS: Calculating the Concentration Term* (EPA, 1992) and used as the EPC. However, when the 95% UCL for a given radionuclide was greater than the maximum concentration detected, the maximum detected value was used as the EPC, rather than the 95% UCL. Additionally, if the data set of a constituent has a distribution that was neither normal nor log normal, the maximum detected value was used as the EPC. The distribution of each data set was tested for normality using the Shapiro-Wilke normality test. The equations used to calculate the UCL for normal and log normal data sets are presented below.

The UCL of the arithmetic mean for a normal distribution was calculated as follows:

$$\mathrm{UCL} = \bar{x} + t\,(s/n^{1/2})$$

where:

UCL	=	upper confidence limit
t	=	Student t statistic (Gilbert 1987)
s	=	standard deviation
n	=	number of data
$\bar{x}$	=	mean of data results

The UCL of the arithmetic mean for a log normal distribution was calculated using the following equation:

$$UCL=e^{\bar{x}+0.5s^2+sH/((n-1)^{1/2})}$$

where:

UCL	=	upper confidence limit
H	=	H statistic (Gilbert 1987)
s	=	standard deviation
n	=	number of data
e	=	exponential constant
$\bar{x}$	=	mean of data results

The exposure point concentrations defined above were used to estimate the intake of each COPC to individual receptors via all pathways and medium proposed in the conceptual model. Intake is a measure of exposure expressed as the concentration of a constituent that has come in contact (e.g. ingestion, inhalation, dermal, etc.) with a receptor per unit body weight per unit of time [milligram per kilogram day (mg/kg-d)].

6.4 TOXICITY ASSESSMENT

With the exception of uranium, the toxicity criteria for the COPCs identified for the Painesville site are limited to carcinogenic risk. That is, only uranium is considered as both a carcinogenic and non-carcinogenic hazard. The other radionuclides that are COPCs have no non-carcinogenic risk factors and under FUSRAP only these radionuclides may be remediated. To estimate radiological risk, the RESRAD code utilizes Health Effects Assessment Summary Table (HEAST) CSF values. These slope factors are presented in units of risk per pCi (internal pathways) or risk per year per pCi/g (external pathway).

Uranium, in soluble form, is a kidney toxin at concentrations slightly above background levels, and is the only radionuclide for which the chemical toxicity has been identified to be comparable to or greater than the radiotoxicity. Of the COPCs identified by the BRA only uranium is considered as both a carcinogenic and non-carcinogenic hazard. For this reason, the radiological risk of uranium was estimated using the RESRAD code which utilizes HEAST CSF values while chemical toxicity was estimated using the reference dose factor (RfD).

A CSF for a radionuclide is defined differently than a CSF for non-radiological constituents. EPA outlines these differences in the *Radiation Exposure and Risk Assessment Manual* (EPA 1996). Major differences include the following:

- the endpoint for radiological constituents is fatal cancer – the endpoint for non-radiological constituents endpoint is tumorigenic cancer; This changed in 2001 when HEAST radiological CSFs included both fatal and non-fatal cancer.
- radiological risk estimates are based primarily on human data – non-radiological constituent risk estimates are based primarily on animal studies; and
- radiological risk estimates are based on the central estimate of the mean – non-radiological constituent risk estimates are based on 95% UCL of the mean.

Additional considerations include the fact that EPCs for radionuclides and non-radionuclides are specific to distinct models incorporating different assumptions; RAGS cautions against combining radiological and non-radiological risks. Given these differences, non-carcinogenic risk and carcinogenic risk from radionuclides were assessed separately. The non-carcinogenic hazard index associated with exposure to uranium in soil is presented in Tables 6.10, 6.11 and 6.12. Table 6.10 presents non-cancer risk for an industrial worker exposed to uranium in surface soil (soil 0-2 ft bgs) while Tables 6.11 and 6.12 present non-cancer risks for a resident and subsistence farmer exposed to uranium in total soil (soil 0-10 ft bgs), respectively.

6.5 RISK CHARACTERIZATION

Risk characterization integrates the findings of the exposure assessment and toxicity assessment to estimate the likelihood that a receptor will get cancer as a result of exposure to radiological COPCs. Risks were calculated from toxicity information and the results of the exposure assessment. Total risk refers to risk associated with all COPCs in an exposure unit. Site-related risk refers to the risk associated with the COPCs as a result of MED/AEC activity. Contributions from background are not included in these evaluations. Specifically, when the gross EPC was larger than the background UTL, average background was subtracted producing a net EPC. Otherwise the net EPC was assumed to be zero. The incremental lifetime cancer risk (ILCR) was calculated and compared to the acceptable range specified in the NCP, (EPA 1990) of 10^{-6} to 10^{-4}, or one in one million to one in 10,000 excess persons developing a fatal cancer as the result of exposure to COPCs. As indicated in Section 6.4 the endpoint for radiological risk is fatal cancer not just tumorigenic cancer. The RESRAD code provides estimates of the total excess cancer risk for initially existent radionuclides by pathway. Radiological dose estimates in mrem/yr are also provided for soil for comparison against dose-based goals. RESRAD provides both risk and dose estimates in a single run.

For soil, risk was estimated using the EPC values listed in Table 6.1 through 6.8 and the RESRAD code Version 6.2. Because there is a mixture of radionuclides in the site data, risk estimates were calculated covering a 1,000-year period. The maximum risk over this period was then selected for comparison to risk criteria. Table 6.13 summarizes COCs identified by the RESRAD runs. Table 6.14 presents dose estimates for each EU and receptor.

RESRAD calculates dose (and risk) over a 1000-year evaluation period to account for the ingrowth and decay of radionuclides. For example, Th-230 typically produces highest risk at the end of the 1000-year evaluation period, after there has been significant ingrowth of Ra-226. Risk calculations for current receptors do not necessarily account for ingrowth or decay, as, by definition, this receptor would be exposed to radionuclides present at the time of the risk evaluation. However, risk calculations for future receptors could reach a maximum any time within the evaluation period dependent on the ingrowth and decay of radionuclides like Ra-226. To account for the possibility that future risk could reach a maximum well into the future, reported risk results are given for the year of maximum exposure.

A distinction is made between the maximum risk from exposure within a particular area and risk from an individual radionuclide in the development of cleanup goals. The source term for a particular area is usually defined by an estimate of the average concentration (possibly the 95% UCL) and the year of maximum exposure which is dependent on the mix of radionuclides. For example, maximum risk might occur in year 1000 if there are high concentrations of Th-230 or at some other year if the source is dominated by other radionuclides. In any case, the RESRAD code balances ingrowth and decay for a particular source term and the risk assessor only has to identify the year of maximum exposure in the RESRAD output.

Risk characterization integrates the findings of the exposure assessment and toxicity assessment to estimate the likelihood that a receptor may experience an adverse effect as the result of exposure to COPCs (EPA 1989). Risks were calculated using toxicity information and intakes calculated as part of the exposure assessment. Total site risk refers to the risk associated with all COPCs at the site. Site-related risks refer to the risk associated with the COPCs present as a result of MED/AEC-related activity;

constituents present at or below background concentrations were not included in these evaluations. Background risk refers to risk associated with COPCs that are present due to natural or anthropogenic causes other than site-related activity.

6.6 UNCERTAINTY ASSESSMENT

Risk values calculated in a HHRA are not fully probabilistic estimates of risk, but are conditional estimates using a considerable number of conservative assumptions about exposure and toxicity. Therefore, there are many uncertainties inherent in the risk assessment evaluations. Uncertainty will always surround estimates of environmental concentrations at waste sites. The objective is to understand, minimize, and quantify this uncertainty in the risk assessment. There are uncertainties with the exposure assessment, the toxicity information used in the risk assessment, and the risk characterization.

6.6.1 Uncertainty Related to Environmental Data

Uncertainty is associated with the process of data collection, analysis, and evaluation. The characterization of data from waste sites presents considerable uncertainty due to variation in wastes, environmental media, and time.

The sampling program at the Painesville site was designed to minimize the potential to underestimate exposure point concentrations. Background levels were established using data collected from locations on or near the site. Background was established to distinguish between naturally occurring or ubiquitous anthropogenic radionuclides found near the site from radionuclides associated with past waste activities at the areas under investigation.

Uncertainty is minimized in the analysis of the data by adhering to strict QA/QC standards both in the field and in the laboratory. Uncertainty associated with the statistical analysis of environmental data is low, with little introduction of bias.

6.6.2 Uncertainty in Exposure Assessment

Exposure assessment may introduce considerable uncertainty in the risk assessment process. Uncertainty in all elements of the exposure assessment are brought together and compounded in the estimate of intake or dose. The professional judgment of the risk assessor becomes particularly important. The risk assessor must examine and interpret diverse information, including the nature, extent, and magnitude of contamination; transport of chemicals in the environment; identification of exposure routes; identification of receptor groups currently at risk and potentially at risk in the future; and activity patterns of receptors and receptor groups.

The following types of uncertainty have been identified in the exposure assessment:

- Scenario Uncertainty--missing or incomplete information needed to define the exposure scenario or pathway;
- Model Uncertainty--inability to quantify all assumptions in model variables; and
- Parameter Uncertainty--inadequate information to quantify an exposure variable or parameter.

Receptors for the EUs at the Painesville site were defined based on information provided by the facility and on-site observations. Site-specific information for the EUs was used to develop exposure assumptions and intake parameters, if available. However, many assumptions were based on EPA standard default parameters. Many of the RME exposure parameters represent 90th to 95th percentile values. When several upper bound values are combined in estimating exposure for any one pathway, resulting risk estimates may well be in excess of the 99th percentile exposure and thereby be outside the range of exposures that might reasonably be expected to occur at a site. Therefore, resulting risks calculations are conservative and most likely overestimate the actual exposures that may be associated with the site. The central tendency (CT) scenario was provided to account for this overestimation.

The risk assessment treats each exposure parameter as a single point estimate. None of these parameters is truly a single value. Instead, a range of values or distribution would more accurately represent these parameters. Defining a range of values for any given parameter is actually a measure of variability in the risk assessment. Quantitative uncertainty analysis allows one to measure this variability, but poses difficulties because of the quantity and quality of data available.

6.6.3 Uncertainties Related to Toxicity Information

Although EPA provides toxicity values that are point estimates, a significant amount of uncertainty may surround these point estimates. Identification of the sources of this uncertainty enables the risk assessor to establish the degree of confidence associated with the toxicity measures. Uncertainty is inherent within the toxicity assessment and is primarily due to differences in study design, species, sex, routes of exposure, or dose-response relationships. A major source of uncertainty involves using toxicity values based on experimental studies that substantially differ from typical human exposure scenarios. The derivation of the toxicity values must consider differences such as (1) using dose-response information from animal studies to predict effects in humans, (for chemicals), (2) using dose-response information from the Hiroshima and Nagasaki atomic bomb survivors (for radionuclides), (3) using dose-response information from high-dose studies to predict adverse health effects at low doses, (4) using data from short-term studies to predict chronic effects, and (5) extrapolating from specific homogeneous populations to general heterogeneous populations.

6.6.4 Identification of Radiological Constituents of Concern

COCs were conservatively identified as those individual radionuclides that contribute a single-pathway risk greater than 10^{-6}, even if the total radiological risk for a particular receptor and medium is less than 10^{-4}. Ten radionuclides (Ac-227, Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238) were identified as COCs for the Painesville site. The industrial worker, the hypothetical residential scenario and the subsistence farmer produced risk estimates in excess of 10^{-4}. COCs are identified only for soil since no radiological COCs were identified for sediment, surface water or groundwater. COCs for the Painesville site are listed by medium in Table 6.13.

6.6.5 Radiological Risk Summary

For soil, risk was estimated using the EPC values listed in Table 6.1 through 6.8 and the RESRAD code Version 6.2. Because there is a mixture of radionuclides in site soil, risk estimates were calculated covering a 1,000-year period. Total excess cancer risk was calculated and compared to the acceptable range specified in the NCP,(EPA 1990) of 10^{-6} to 10^{-4}, or the probability of cancer morbidity (fatal plus nonfatal). The RESRAD code provides estimates of the total excess cancer risk for initially existent radionuclides by pathway. Maximum risk over the 1,000 year period was then selected for comparison to risk criteria. Table 6.13 summarizes the radiological COCs identified by the RESRAD runs. Table 6.14 presents dose estimates for each EU and receptor and Table 6.15 presents the maximum baseline risk for each EU and receptor. The individual RESRAD output data for each EU is included in its entirety in Appendix J.

Risk to the industrial worker was evaluated for surface soil (0-2 feet bgs). The highest level of risk for the industrial worker was seen in EUs 6 and 8 where total excess cancer risk was 3.2×10^{-3} and 5.4×10^{-3}, respectively. The next highest level of risk for an industrial worker was found at EU 1 where radiological risk was $1.6x10^{-3}$. Excess cancer risk in EUs 2, 3, 4, and 5 was $1.4x10^{-4}$, $9.1x10^{-4}$, $4.2x10^{-4}$ and $5.7x10^{-4}$, respectively. No COPCs were identified for EU 7 so radiological risk was not evaluated.

Since no residential structures are currently in place at the site, for the future resident scenario it was assumed that residents could be exposed to soil (soil 0-10 feet bgs). This assumes that soil currently at depth is brought to ground surface during home construction. The highest level of risk for the hypothetical future resident was seen in EU 6 where total excess cancer risk was $9.9x10^{-3}$. The next highest level of risk was found at EU 1 where radiological risk was $2.2x10^{-3}$. Excess cancer risk in EUs 2, 3, 4, 5 and 8 was $4.5x10^{-4}$, $1.8x10^{-3}$, $6.3x10^{-4}$, $4.2x10^{-4}$ and $1.3x10^{-3}$, respectively.

The future subsistence farmer scenario includes exposure to soil 0-10 feet bgs which assumes that soil currently at depth is brought to ground surface during home or out building construction. The subsistence farmer scenario also includes exposure to MED/AEC contaminants through food pathways (e.g. vegetable, meat, milk) raised or collected on site. It was also assumed that the subsistence farmer utilized groundwater for agricultural and domestic purposes. The highest level of risk for the hypothetical future subsistence farmer was seen in EU 6 where total excess cancer risk was $2.4x10^{-2}$. The next highest level of risk was found at EU 1 where radiological risk was $6.0x10^{-3}$. Excess cancer risk in EUs 2, 3, 4, 5 and 8 was $1.2x10^{-3}$, $5.0x10^{-3}$, $1.4x10^{-3}$, $7.7x10^{-4}$ and $2.4x10^{-3}$, respectively.

6.6.6 Remedial Action Objectives (RAOs)

RAOs were derived for surface soil and total soil considering dose-based endpoints. The concentrations corresponding to the dose based endpoint of 25 mrem/year for a subsistence farmer scenario using site-specific parameters is presented in Table 6.16 and may be selected as RAOs for the Painesville site.

The following two potential ARARs were considered in this assessment:

1) 10 CFR Part 20, *Standards for Protection Against Radiation* (Subpart E may be relevant and appropriate) and
2) OAC 3701-1-38 *General Radiation Protection Standards for Sources of Radiation, part 22 defines the requirements for unrestricted release.*

Although these standards are not applicable for the Painesville site, each may be relevant and appropriate and are considered in order to identify potential radiological action levels. The official set of ARARs is identified in the feasibility study (FS) which follows this document.

As previously indicated, 10 CFR Part 20 Subpart E was used to calculate action levels. Subpart E limits the dose to 25 mrem/yr for a site to be released for unrestricted use. Action levels are calculated for each radiological COC for comparison to the 25 mrem/yr limit with the same approach used to estimate benchmark values. Action levels based on 10 CFR Part 20 Subpart E are listed in Table 6.16.

OAC 3701-1-38-22 adopts the same required dose equivalent as 10 CFR 20 Subpart E. However, the dose must be for unrestricted use unless a license will remain in place and the critical group consistently used by Ohio is the subsistence farmer.

Table 6.16 lists potential action levels by medium, receptor, and radionuclide. If 10 CFR Part 20 Subpart E and OAC 3701-1-38-22 are selected, the dose limit will be total for exposure from all complete pathways. The combined dose from exposure to soil from all pathways may not exceed benchmark values or 25 mrem/yr limits, as appropriate. The application of a total dose criterion will depend on the remedial alternatives defined in the FS, and will be addressed in more detail there.

6.7 SCREENING RISK ASSESSMENT OF TERRESTRIAL BIOTA EXPOSED TO RADIONUCLIDES IN SOIL

6.7.1 Rationale

For the screening ecological risk assessment (SERA) it was assumed that terrestrial biota live and forage in the Painesville EUs. These biota are exposed to COPCs in soil. The conceptual model of exposure describes both external and internal exposure. Biota at all levels are assumed to receive external radiation when they are in contact with soil. In addition, radionuclides in soil are bioaccumulated in soil invertebrates, which serve as food for small mammals and birds that eat soil invertebrates. These predators bioaccumulate COPCs from their food, and thus receive internal radiation from the soil COPCs.

The approach taken in this assessment was to use screening levels developed by methods used at the Paducah Gaseous Diffusion Plant (PGDP) for exposure of biota to radionuclides in soil (DOE 2000). While this is a draft document, the methods for development of radionuclide screening benchmarks follow methods published by Oak Ridge National Laboratory (Sample et al. 1997). The method uses screening benchmark radiation doses that are one-tenth of the generally accepted safe daily doses for invertebrates, mammals, and birds (NCRP 1991). This method including equations is described in detail in Section 6.7.2 and inputs are contained in Tables 6.15 through 6.18.

The purpose of the screening-level ERA was to evaluate whether existing data justify a decision that site contaminants do not pose a risk to ecological receptors, or whether additional evaluation is necessary. Because the consequences of incorrectly deciding that there is risk when there is not (further evaluation) are less severe than incorrectly concluding there is no risk when there is risk (not reducing or eliminating risk) the screening-level ERA was designed to minimize the likelihood of the latter, false negative error. That is, the screening-level ERA was intentionally conservative. If no potential for risk is identified in a conservative screening-level ERA, then risk managers can confidently conclude that no further action such as investigation or remediation is required at the site.

6.7.2 Inputs and Methods

EPCs for COPCs in soil at each EU are given in Tables 6.1 through 6.8. EPCs are either the 95th percentile UCL or the maximum observed value, whichever is lower as described in Section 3.4.2. The screening benchmark level for radionuclides is a threshold "no effect" dose. The screening benchmark levels are based on biological effects to organisms exposed to single constituents by direct contact with the medium and by ingestion of contaminated food. For soil exposure, the organisms evaluated were earthworms, terrestrial small mammals, and terrestrial birds. Soil invertebrates are exposed to radionuclides in soil by internal radiation from ingestion of soil and by external radiation from the soil they live in. Terrestrial small mammals and birds are assumed to be exposed by internal radiation from ingestion of prey (assumed to be soil invertebrates) and by external radiation from the soil they live on or in. For exposure of terrestrial biota at Painesville, screening benchmark concentrations were calculated by using the method used for the PGDP no further action sites, using bioaccumulation factors (BAFs) for predators as well as for earthworms.

The equations for external exposure to soil are:

Surface Soil

Surface dose (rad/d) = $C_s \times f_{aboveground} \times 0.7 \times 5.12\times10^{11} \times DCF \times 2$

where:

C_s = concentration of COPC (pCi/g soil)

$f_{aboveground}$ = fraction of time animal is assumed to spend on ground surface

0.7 = roughness factor for ground surface

5.12×10^{11} = conversion factor (rad/d per pCi/g x mev/disintegration)

DCF = dose conversion factor (sv/s per Bq/m^3) (Eckerman and Ryman 1993)

2 = height factor to adjust for exposure close to ground surface

Subsurface Soil

Subsurface dose (rad/d) = $C_s \times 1.05 \times f_{belowground} \times 5.11\times10^{-5} \times$ (Beta energy + Gamma energy × Gamma absorption)

where:

C_s = concentration of COPC (pCi/g soil)

1.05 = conversion factor to account for immersion in soil rather than water (Sample et al. 1997)

$f_{belowground}$ = fraction of time animal is assumed to spend on ground surface

0.0000511 = conversion factor (rad/d per pCi/g×mev/disintegration)

Beta energy = energy of beta decay (mev/disintegration) (Eckerman and Ryman 1993)

Gamma energy = energy released by change of energy level (mev/disintegration) (Eckerman and Ryman 1993)

Gamma absorption = fraction of gamma energy absorbed by tissue (Blaylock et al. 1993)

Earthworms were assumed to spend all of their time underground. Terrestrial small mammals were assumed to spend half of their time in burrows under the surface and half of their time on the surface. Terrestrial birds were assumed to spend no time under the surface and half of their time on the ground surface. The equation for internal ingestion is:

Internal dose (rad/d) = $C_i \times 5.11\times10^{-5} \times$ (20 × Alpha energy + Beta energy + Gamma energy × Gamma absorption)

where:

C_i = internal concentration of COPC = BAFi or BAFmamm × C_s

0.0000511 = conversion factor (rad/d per pCi/g×mev/disintegration)

20 = quality factor to account for greater damage done by alpha radiation

Alpha energy = energy of alpha decay (mev/disintegration) (Eckerman and Ryman 1993)

Beta energy = energy of beta decay (Eckerman and Ryman 1993)

Gamma energy = energy released by change of energy level (mev/disintegration) (Eckerman and Ryman 1993)

Gamma absorption = fraction of gamma energy absorbed by tissue (Blaylock et al. 1993)

Internal concentrations were calculated for earthworms by multiplying the soil concentration by the bioaccumulation factor for invertebrates (BAFi) for each radionuclide (Table 6.17). Small mammal and bird tissue concentrations were estimated by multiplying the concentration in earthworms by a bioaccumulation factor for mammals (BAFmamm) that was calculated from the ingestion-to-beef transfer factors published by Baes et al. 1984. The BAFmamm is calculated by multiplying the transfer factor (mg/kg tissue per mg ingested/d) by an estimated food consumption rate of 50 kg/d for cattle (Baes et al.

1984) to arrive at the bioaccumulation factor BAFmamm, in units of mg/kg tissue per mg/kg food. BAFmamm values are also found in Table 6.17.

Terrestrial mammals and birds are more sensitive to radiation than invertebrates (NCRP 1991). The acceptable daily doses for invertebrates and vertebrates of 1.0 rad/d and 0.1 rad/d, respectively, (NCRP 1991) were multiplied by a safety factor of 0.1 to give the target daily doses of 0.1 rad/d for earthworms and 0.01 rad/d for small mammals and birds. This value is divided by the combined external and internal dose factors to yield the soil concentration that would provide the target daily dose of each COPC. The radionuclide screening benchmarks were derived for parent isotopes and all short-lived daughter products using the radionuclide exposure model of Sample et al. (1997), and thus included internal and external exposures from all major alpha, beta, and gamma emissions for each isotope and its decay products. Benchmarks were calculated in such a way that the sum of doses from one parent and all of its daughter products in equilibrium (that is, with equal activities in soil) is equal to the screening benchmark, 0.1 or 0.01 rad/d. Screening benchmarks for soil invertebrates were used because exposure of soil invertebrates, which live in close contact with soil and ingest large quantities of soil, is higher than exposure of terrestrial mammals.

The screening benchmark is the soil concentration at which the receptor receives the screening radiation dose. It is calculated by adding external and internal doses and solving the resulting dose equation for soil concentration when the dose is the screening benchmark. This was done by dividing the screening benchmark dose, 0.1 rad/d for earthworms and 0.01 rad/d for mammals and birds, by all of the factors except soil concentration in the dose equation. For example, the screening benchmark for earthworms was calculated as:

$$\begin{aligned}\text{Dose} &= \text{Surface external dose} + \text{Subsurface external dose} + \text{Internal dose} \\ &= (C_s \times f_{aboveground} \times 0.7 \times 5.12\times10^{11} \times \text{DCF} \times 2) + (C_s \times 1.05 \times f_{belowground} \times 5.11\times10^{-5} \times (\text{Beta energy} + \text{Gamma energy} \times \text{Gamma absorption})) + (C_s \times \text{BAFi} \times 5.11\times10^{-5} \times (20 \times \text{Alpha energy} + \text{Beta energy} + \text{Gamma energy} \times \text{Gamma absorption}))\end{aligned}$$

$$0.1 \text{ rad/d} = C_s \times [(f_{aboveground} \times 0.7 \times 5.12\times10^{11} \times \text{DCF} \times 2) + (1.05 \times f_{belowground} \times 5.11\times10^{-5} \times (\text{Beta energy} + \text{Gamma energy} \times \text{Gamma absorption})) + (\text{BAFi} \times 5.11\times10^{-5} \times (20 \times \text{Alpha energy} + \text{Beta energy} + \text{Gamma energy} \times \text{Gamma absorption}))]$$

and

$$C_s = 0.1 / [(f_{aboveground} \times 0.7 \times 5.12\times10^{11} \times \text{DCF} \times 2) + (1.05 \times f_{belowground} \times 5.11\times10^{-5} \times (\text{Beta energy} + \text{Gamma energy} \times \text{Gamma absorption})) + (\text{BAFi} \times 5.11\times10^{-5} \times (20 \times \text{Alpha energy} + \text{Beta energy} + \text{Gamma energy} \times \text{Gamma absorption}))]$$

Tables 6.18 through 6.20 presents the screening benchmarks for earthworms, small mammals, and birds, respectively, that were used to screen each COPC. The screening benchmark for each COPC was compared to the EPC for each COPC at each EU.

6.7.3 Screening of Soil Invertebrates

Table 6.21 presents the screening benchmark concentrations for earthworms and the EPCs of COPCs at each EU. All EPCs were below the screening benchmark concentrations. The highest exposures were from Ra-226, which had concentrations at EU 1, EU 3, and EU 6 that were about 15%, 10% and 60%, respectively in the 0-10 foot soil layer and at EU 1 EU 6 and EU 8 that were 29%, 43%, and 37% respectively in the 0-2 ft soil layer, of the screening benchmark values. Therefore, it was concluded that exposure of soil-dwelling invertebrates to COPCs at the EPC for each EU is unlikely to cause harm from radiation doses.

6.7.4 Screening of Terrestrial Small Mammals

Table 6.22 presents the screening benchmark concentrations for small mammals and the EPCs of COPCs at each EU. All EPCs were below the screening benchmark concentrations. The highest exposures were from Ra-226, which had concentrations at EU 1, EU 3, and EU 6 that were about 20%, 12% and 83%, respectively in the 0-10 soil foot layer and at EU 1 EU 6 and EU 8 that were 39%, 58%, and 37% respectively in the 0-2 ft soil layer, of the screening benchmark values. Therefore, it was concluded that exposure of terrestrial small mammals to COPCs at the EPC for each EU is unlikely to cause harm from radiation doses.

6.7.5 Screening of Terrestrial Birds

Table 6.23 presents the screening benchmark concentrations for terrestrial birds and the EPCs of COPCs at each EU. All EPCs were below the screening benchmark concentrations. The highest exposures were from Ra-226, which had concentrations at EU 1, EU 3, and EU 6 that were about 11%, 7% and 46%, respectively in the 0-10 foot layer and in EU 1, EU6 and EU 8 that were 21%, 32%, and 28% respectively in the 0-2 ft soil layer, of the screening benchmark values. Therefore, it was concluded that exposure of terrestrial birds to COPCs at the EPC for each EU is unlikely to cause harm from radiation doses.

6.7.6 Conclusions of the Screening ERA

The screening ERA was performed for earthworms, terrestrial small mammals, and birds exposed to COPCs in eight EUs at Painesville. EPCs and exposure equations were chosen to make exposures conservative. Screening benchmark doses were set at 0.1 rad/d for earthworms and 0.01 rad/d for small mammals and birds. Each benchmark was the safe daily dose published by NCRP (1991) multiplied by a safety factor of 0.1. Soil screening benchmarks were calculated by modeling the sum of external and internal exposures for each receptor. EPCs of COPCs at each EU were compared to the screening benchmarks. No COPC EPC exceeded its screening benchmark at any EU. Radium-226 contributed the most to daily dose, but all radium-226 concentrations were below the screening benchmark, and thus below one-tenth of the allowable daily dose. It was concluded that exposure of terrestrial biota to radiation doses from radionuclides at all EUs is unlikely to cause harm.

6.7.7 Weight-of-Evidence Analysis about Habitats

The habitats at Painesville consist of small (121 m^2) to large (2489 m^2) patches. Many habitat patches have grass and old field or weedy cover, while others consist mostly of asphalt and gravel. Table 6.24 provides the key information about the name, size in square meters and hectares, and cover type. The size was determined with computer-aided measurements while the cover was directly observed and recorded by SAIC scientists. Size and cover type were the two technical traits used in the weight-of-evidence or evaluation of the usefulness of habitat from the viewpoint of wildlife.

Wildlife have home ranges, the area where they feed, hide from predators, and reproduce, whose sizes range from 0.36 hectare (ha) (shrew) and 0.42 ha (robin) to 175 ha (deer) and 596 ha (fox) (EPA 1997). A quick comparison of sizes of the EUs to sizes of the home ranges shows such ratios as follows:

- Area G — 0.0121 ha (size of Area G per Table 6.24) to 0.36 ha (size of home range of shrew per EPA 1997) = 0.0336, or Area G represents about 3% of the area needed by a shrew.

- 0.0121 ha (Table 6.24) to 596 ha (fox) = 0.0000203 or Area G provides about 0.002% of the area needed by a fox.

- Area A — 0.2489 ha (Table 6.24) to 0.36 ha (shrew) = 0.69, or Area A provides about 69% of the area needed by a shrew.
  - 0.2489 ha (Table 6.24) to 596 ha (fox) = 0.00042, or Area A represents about 0.04% of the area need by a fox.

The sizes of the EUs vary between 0.0121 ha (Area G) and 0.2489 ha (Area A), and the sizes of home ranges vary between 0.36 ha (shrew) and 596 ha (fox). The larger the EU the better because larger EUs could support more individuals or a larger portion of a home range of a large home-range organism.

The second consideration was the type of cover. Habitats range from pavement and gravel (Area D), building foundations and a little grass (post 1950 structure) to all grass (Area B) and old field, high vegetation (Area I). The grassier or more vegetation on the habitat the better.

Thus, an EU can be of appreciable size but be covered with gravel where the nearest habitat is buildings, or it can be of small size and covered with vegetation where the nearest habitat is also vegetation. These relationships were taken into consideration in developing the assessment based on professional judgment.

Small habitats (e.g., 121 m^2 and 281 m^2) are assumed to be less desirable than large habitats (1357 m^2 and 2489 m^2) for wildlife. And when cover consists of gravel and asphalt, this is another environmental condition of low attraction for wildlife. Thus, the following two habitat patches of the eight habitat patches are considered least attractive to ecological receptors:

- EU 4-Area D — small area (403 m^2) and asphalted with some gravel
- EU 5-Area G — very small area (121 m^2) and gravelly with few plants

Another four of the remaining six habitat patches are of marginal size and/or modest vegetation to provide food and cover for one or more wildlife organisms:

- EU 2-Area B —small area (930 m^2) even though there is grass
- EU 7-Post 1950 Structure — little habitat (building foundations and grass) even though size (960 m^2) is nearly a tenth of a hectare in size
- EU 8-Rubble Pile — little habitat (rubble and sparse weeds) and small size (281 m^2)

Areas H and I had different exposure histories. Area H was found not to have contamination above ARARs, whereas Area I contains several COPCs (Appendix A). Although EU 6-Area I has only a small area (533 m^2) and does not provide valuable habitat by itself, EU 6-Area I is within a larger habitat area including Area H that is not contaminated and that was not a part of the investigation. It is expected that the land surrounding Areas H and I will remain undeveloped for the indefinite future. Terrestrial wildlife like groundhogs, deer, and foxes inhabit the area, (Zikmanis 2001), so the area should be considered valuable habitat. Areas H and I comprise only a small fraction of the habitat. Therefore, habitat conditions in Areas H and I are unlikely to have a marked effect on populations resident in the surrounding habitat.

The last two — EU 1-Area A and EU 3-Area C — are larger (2489 m^2 and 1357 m^2, respectively) and have grass and asphalt or gravel; so, they represent the best of the eight habitat patches in terms of size and cover.

Thus, in this weight-of-evidence analysis about habitats, two of the habitat patches are of little to no value to wildlife, three are marginal, one is surrounded by good habitat and is therefore valuable, and two likely do provide valuable food and cover to some wildlife.

6.7.8 Summary of SERA Results

The SERA, Sections 6.7.1 through 6.7.5 with conclusions in Section 6.7.6, showed that none of the organisms evaluated was at risk due to radionuclides regardless of habitat. When habitat considerations are added to the analysis, as was done in Section 6.7.7, then the Painesville exposure units or habitat patches were found to have limited ecological attraction to wildlife because of small size and no to limited cover. In summary, most ecological resources at Painesville are rather limited, and there is no predicted risk from radionuclides.

7.0 SUMMARY AND CONCLUSIONS

This RI Report presents a detailed analysis of environmental data for the Painesville FUSRAP Site. Conclusions regarding the nature and extent as well as fate and transport of contaminants are conveyed through the conceptual models. The conceptual models and exposure models have been used to assess risks to human health and the environment at the Painesville site. This section summarizes the findings and conclusions of the Painesville Focused RI.

7.1 SUMMARY

The following sub-sections summarize the nature and extent of contamination, fate and transport mechanisms, and the baseline human health and ecological risk assessments as they pertain to AEC-related constituents in on-site soils. Detailed discussions are provided in Sections 4, 5, and 6.

7.1.1 Nature and Extent

Constituents detected at concentrations above background levels were evaluated for environmental media investigated in the RI.

Results of the RI sampling program indicate that the pattern of soil contamination is closely related to site features such as railroad tracks. Other media groundwater, sediment and surface water have been investigated are do not show evidence of contamination. The volumes of soil evaluated as contaminated under the subsistence farmer scenario (the most protective scenario) are listed in Table 7.2.

The most significantly impacted areas for the on-site soils include the areas around the railroad tracks (Area A) next to the butadiene tank and in the area of the former acid digester (Area C). Constituents were detected above background at the other features investigated, but usually at much lower levels.

Ra-226, Th-230, and U-238 were the most commonly AEC-related constituents detected above background in soils from all the IAs. Detections above background at depths greater than a few feet were generally encountered where new foundations or utilities had been constructed. Contamination elsewhere is generally confined to the surface soils.

7.1.2 Fate and Transport

The properties of constituents of concern identified in soil, groundwater, surface water, and sediment during the Focused RI at the Painesville site were assessed qualitatively in conjunction with properties of the environmental media at the site. The major transport pathways for environmental contaminants at the site are listed below:

- Spills, leaks, and dumping
- Shipment and storage of process materials
- Surface water infiltration and leaching of surface soil contaminants to subsurface soil.

Analyses of soils and sediment indicate that infiltrating surface water is the primary medium at Painesville with the potential for contaminant migration. Infiltration along with anthropomorphic disturbance have transported radionuclides into the subsurface soil.

7.1.3 Human Health Risk Assessment

The results of the human health risk assessment indicate Ra-226, Th-230, Th-232 and U-238, contribute most significantly to potential risks, predominately through incidental ingestion of soil and dermal contact with soil. All these constituents can be attributed solely to AEC materials used at the site. The following summary discussion focuses on the AEC-related constituents. COCs are identified by receptor and medium.

Risks from radiological constituents in soil were estimated using RESRAD code Version 6.2. Site-specific risk calculations were performed to select COCs from the list of COPCs. Ten radionuclides (Ac-227, Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238) were identified as COCs for the Painesville site. Because there is a mixture of radionuclides, that will continue to decay and change with time, risk estimates were calculated covering a 1,000-year period. The maximum risk over this period was then selected for comparison to risk criteria. Table 7.1 lists the Painesville radionuclides of concern by medium and receptor.

7.1.3.1 Uncertainties Associated with the HHRA

Exposure assessment may introduce considerable uncertainty in the risk assessment process. Uncertainties in all elements of the exposure assessment are brought together and compounded in the estimate of intake or dose.

The following types of uncertainty have been identified in the exposure assessment:

- Scenario Uncertainty--missing or incomplete information needed to define the exposure scenario or pathway;
- Model Uncertainty--inability to quantify all assumptions in model variables; and
- Parameter Uncertainty--inadequate information to quantify an exposure variable or parameter.

Receptors for the EUs at the Painesville site were defined based on information provided by the facility and on-site observations. Site-specific information for the EUs was used to develop exposure assumptions and intake parameters, if available. However, many assumptions were based on EPA standard default parameters. Many of the RME exposure parameters represent 90th to 95th percentile values. When several upper bound values are combined in estimating exposure for any one pathway, resulting risk estimates may well be in excess of the 99th percentile exposure and thereby be outside the range of exposures that might reasonably be expected to occur at a site. Therefore, resulting risks calculations are conservative and most likely overestimate the actual exposures that may be associated with the site.

The risk assessment treats each exposure parameter as a single point estimate. None of these parameters, however, is truly a single value. Instead, a range of values or distributions would more accurately represent these parameters. Defining a range of values for any given parameter is actually a measure of variability in the risk assessment. Quantitative uncertainty analysis allows one to measure this variability, but poses difficulties because of the quantity and quality of data available.

7.1.4 Ecological Risk Assessment

The screening ERA was performed for earthworms, terrestrial small mammals, and terrestrial birds exposed to COPCs in eight EUs at Painesville. EPCs and exposure equations were chosen to make exposures conservative. Screening benchmark doses were set at 0.1 rad/d for earthworms and 0.01 rad/d for small mammals and birds. Each benchmark was the safe daily dose published by NCRP (1991) multiplied by a safety factor of 0.1. Soil screening benchmarks were calculated by modeling the sum of external and internal exposures for each receptor. EPCs of COPCs at each EU were compared to the screening benchmarks. No ROPC EPC exceeded its screening benchmark at any EU. Radium-226 contributed the most to daily dose, but all Ra-226 concentrations were below the screening benchmark, and thus below one-tenth of the allowable daily dose. It was concluded that exposure of terrestrial biota to radiation doses from radionuclides at all EUs is unlikely to cause harm.

Radiological Constituents of Concern

Radiological constituents of concern Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-235, and U-238 present an ILCR greater than 1×10^{-6}.

Radiological COCs were identified for soil based on the site-specific risk calculations. Total risk results indicate that resident receptors could receive risk greater than 1×10^{-4} in all except EU 6 and EU 7, due to exposure to surface or subsurface soils. For an industrial worker, risk from exposure to surface soil would exceed 1×10^{-4} for all exposure units.

7.2 CONCLUSIONS

7.2.1 AEC-Related COCs

COCs were identified for on-site soils in all exposure units. The COCs in soils for human health include, Ac-227, Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, U-234, U-235, and U-238. There are no COCs for ecological receptors.

The total volume of material with activity-concentrations resulting in a dose exceeding the 25 mrem/year guideline is 4060 yd^3 for the subsistence farmer scenario, and 730 yd^3 for the industrial scenario. These volumes were generated with the EarthVision system. The estimated volume of material that exceeds the 25 mrem/year limit in each area is presented in table 7.2.

7.2.2 Recommended Remedial Action Objectives

Site-specific action levels were developed based on the exposure assumptions and pathways of concern identified in the HHRA. The action levels correspond to an annual dose of 25 mrem for a subsistence farmer scenario.

For COCs, action levels were derived for soil considering dose-based endpoints. The concentration corresponding to the dose endpoint of 25 mrem/year using site-specific parameters is presented to replace the generic PRG derived using RAGS defaults. Radiological action levels are summarized in Table 7.3 and correspond to applicable or relevant standards.

The screening ERA concluded that exposure of terrestrial biota to radiation doses from radionuclides at all EUs is unlikely to cause harm.

7.2.3 Recommendations for Future Work

The RI documented in this report adequately determined the nature and extent of FUSRAP-related contamination and provides an evaluation of the potential impacts to human health and the environment. Based on the results and the conclusions of the RI at the Painesville site, a feasibility study has been conducted.

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RI Figures

	ASPHALT ROAD
	GRAVEL ROAD
	RAILROAD TRACKS
	RIVER OR LAKE
	APPROXIMATE PARK BOUNDARY
	PAINESVILLE SITE
	SCHOOL BUILDING

N
True North

0 350 700
METERS

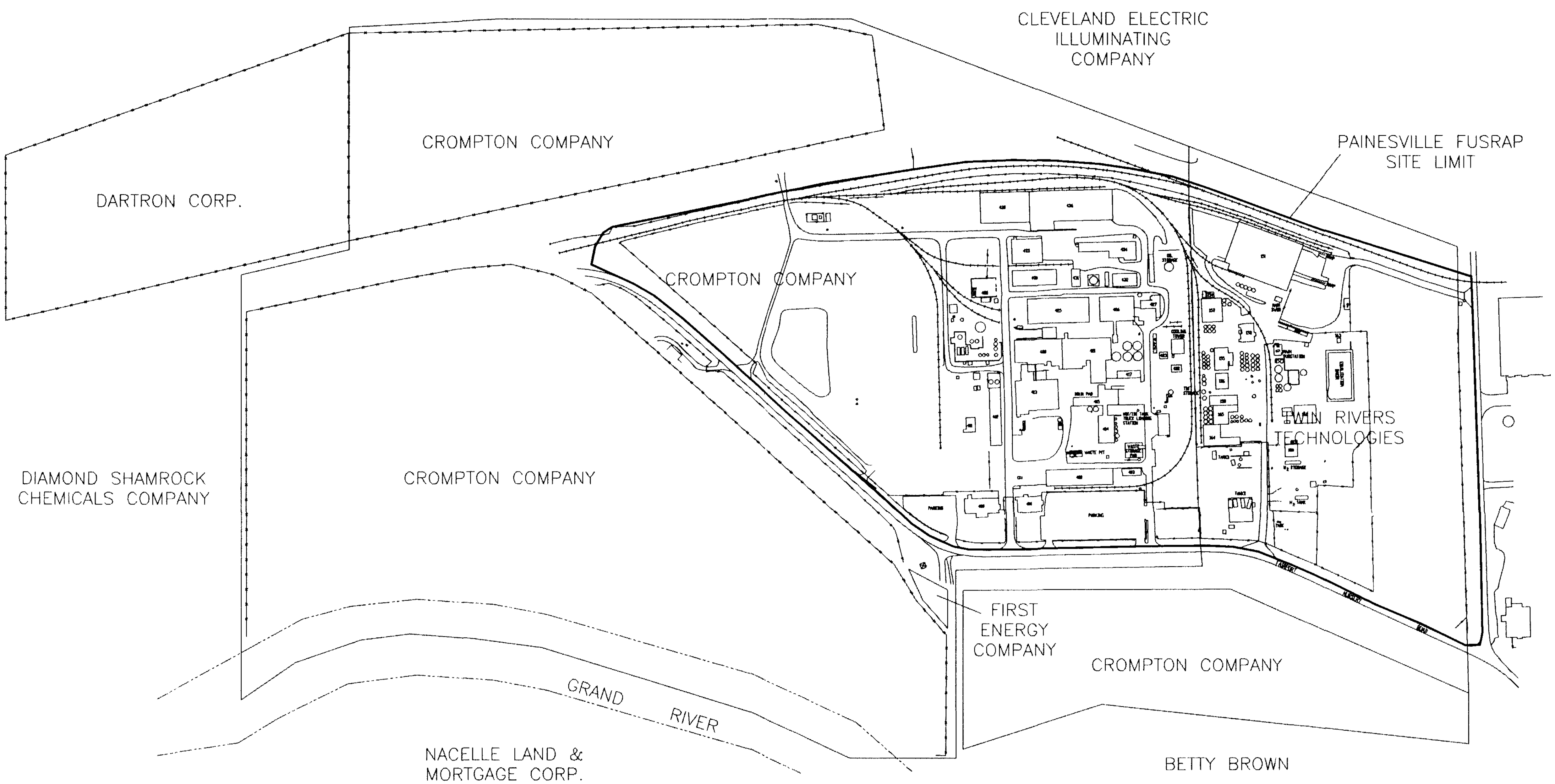
U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Painesville FUSRAP Site in Relation to the Surrounding Area

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
BJW	01/31/02	AS SHOWN	08-4191-120	2.1



PAINESVILLE FUSRAP SITE
PROPERTY BOUNDARY
FENCE LINE
RAILROAD
RIVER BOUNDARY

U.S. Army Corps of Engineers
Buffalo District

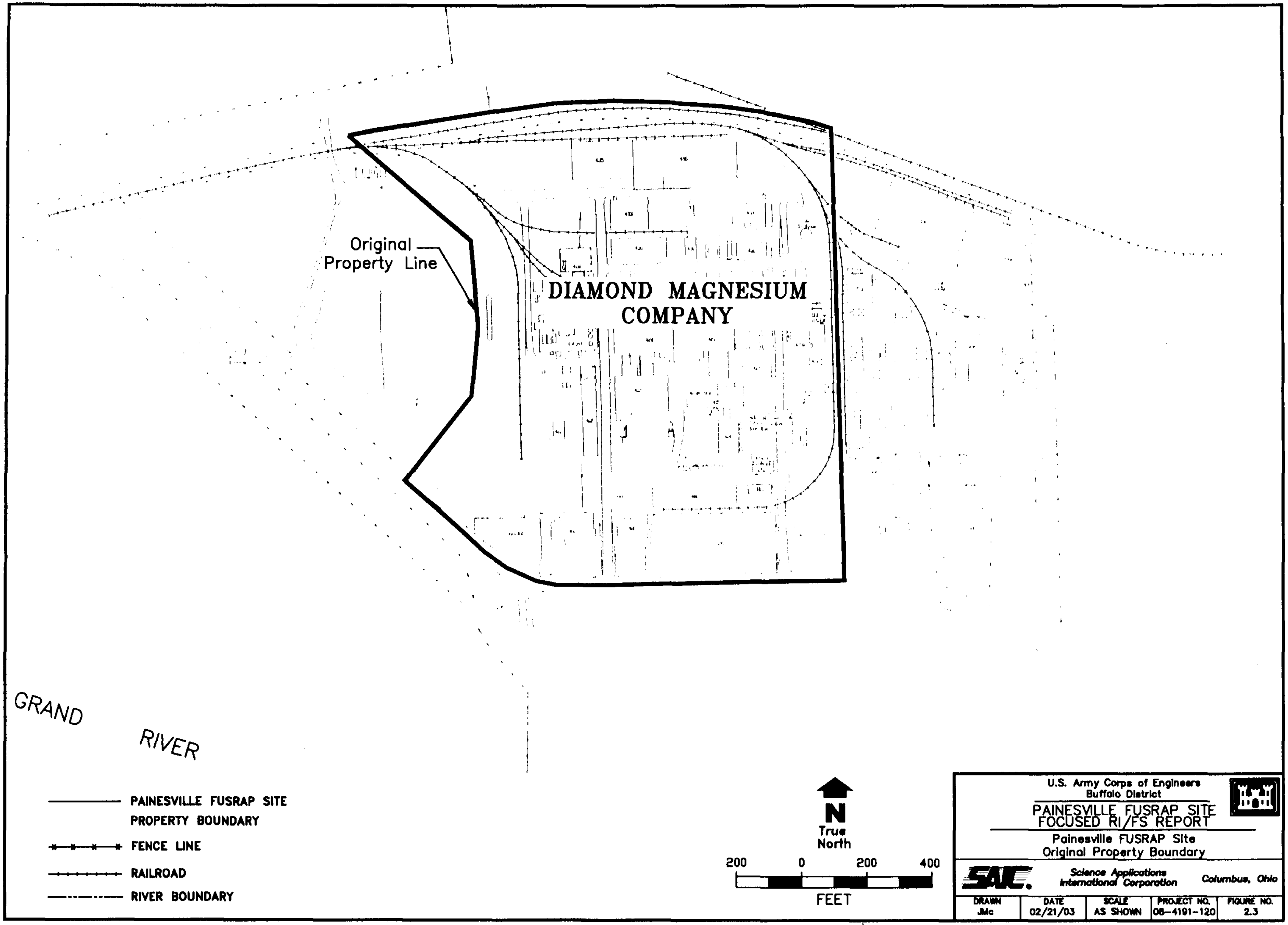
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Painesville FUSRAP Site and Adjoining Properties

SAIC. Science Applications International Corporation — Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/04/03	AS SHOWN	08-4191-120	2.2

FIG 2.2-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 2.2.DWG DATE: FEB 04, 2003 TIME: 1:04 PM CTB: S:\CTB PLOTTING\GRAY7,251,252.CTB



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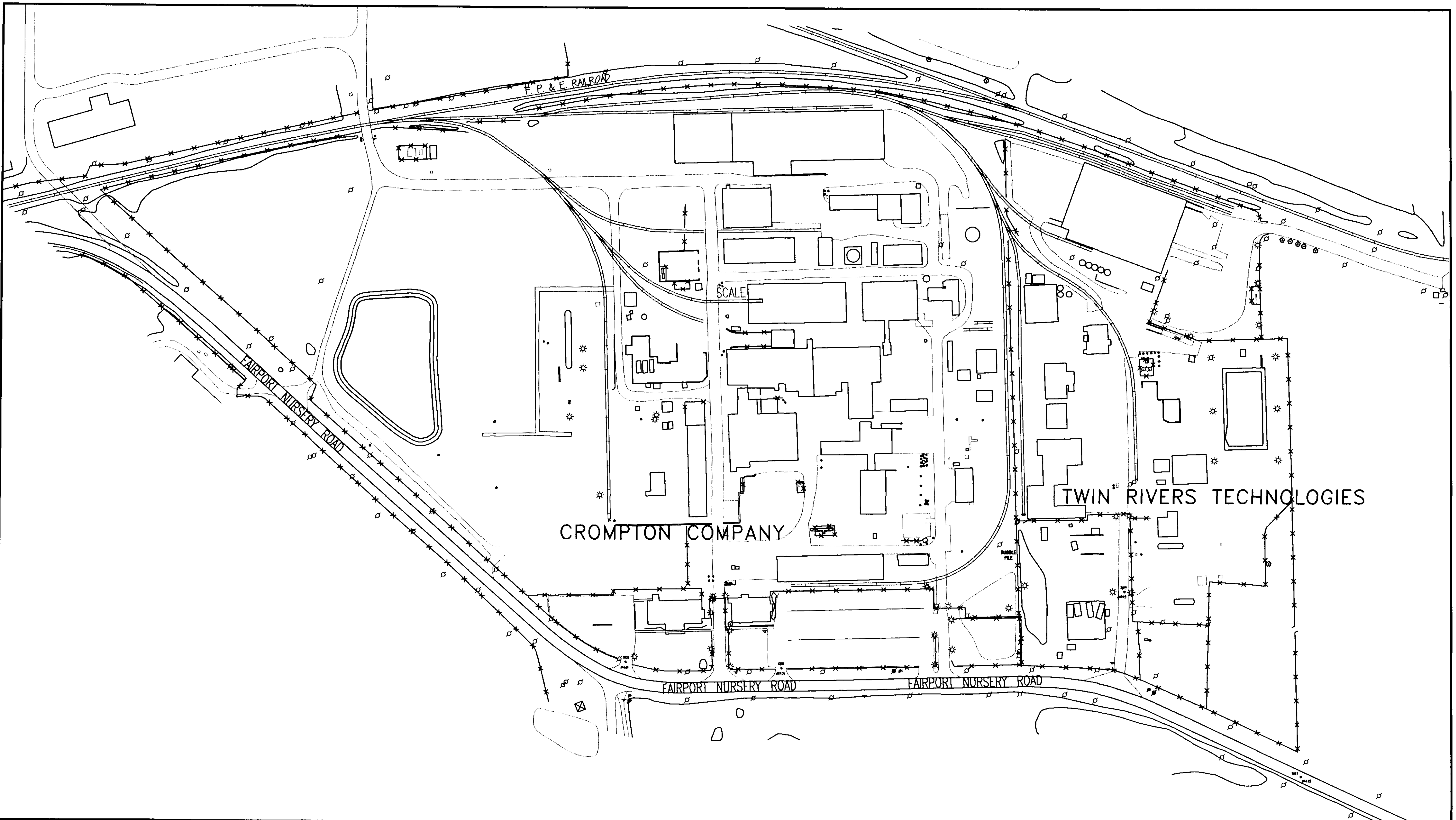


BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
DIRT ROAD
POND BOUNDARY
UTILITY LIGHT POLE

N
True North

30 0 30 60
METERS

U.S. Army Corps of Engineers
Buffalo District

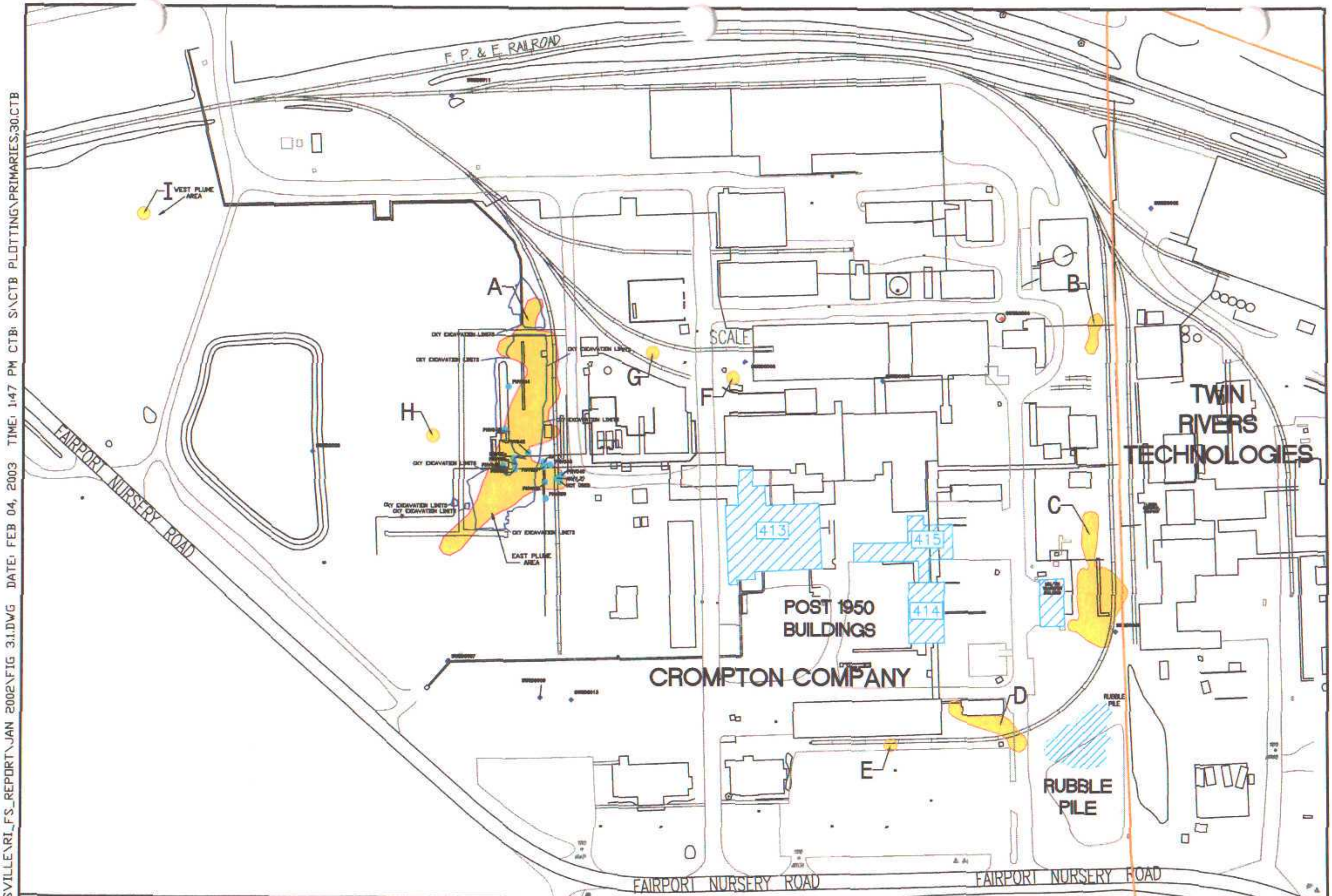
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Painesville FUSRAP Site (Uniroyal and Lonza Properties)

SAIC. Science Applications International Corporation — Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/04/03	AS SHOWN	08-4191-120	2.4

FIGURE 2.4-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 2.3.DVG DATE: FEB 04, 2003 TIME: 1:23 PM CTB: S:\CTB PLOTTING\2,3,6,7.CTB



BUILDING
PROPERTY LINE
FENCE LINE
TREELINE
RAILROAD GRADE
UTILITY LIGHT POLE

A AREA IDENTIFIER
SUM OF RATIOS AREA >1 (1996 DATA)
RUBBLE PILE
POST 1950 BUILDINGS

N True North

30 0 30 60
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

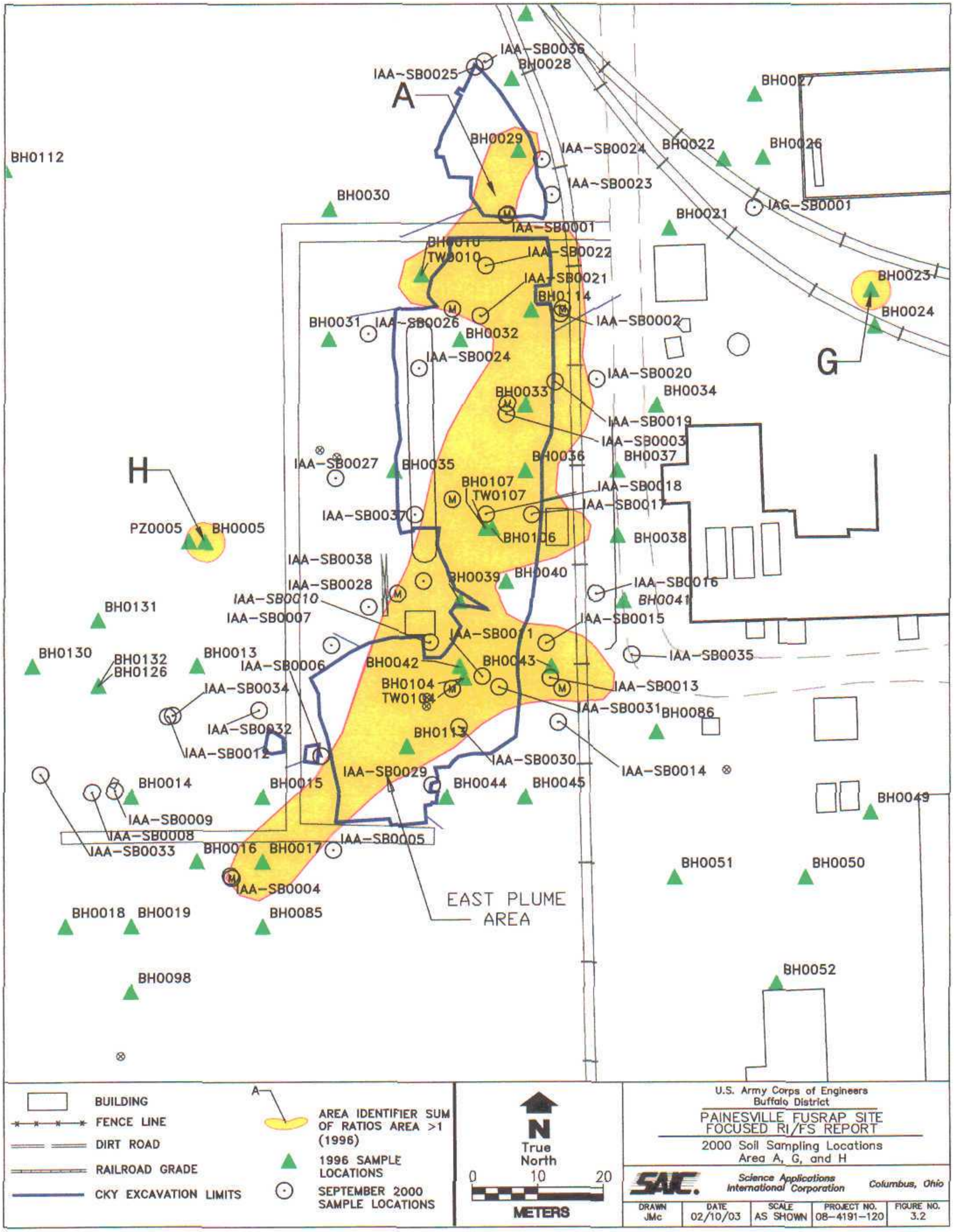
STUDY AREA DELINEATION:
ELEVEN INVESTIGATIVE AREAS (IA)

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/04/03	AS SHOWN	08-4191-120	3.1

FIGURE 3.1-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.1.DWG DATE: FEB 04, 2003 TIME: 1:47 PM CTB: S:\CTB PLOTTING\PRIMARIES,30.CTB

FIGURE 3.2-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.2.DWG DATE: FEB 10, 2003 1:31 PM CTB: S:\CTB PLOTTING\PRIMARIES,30.CTB



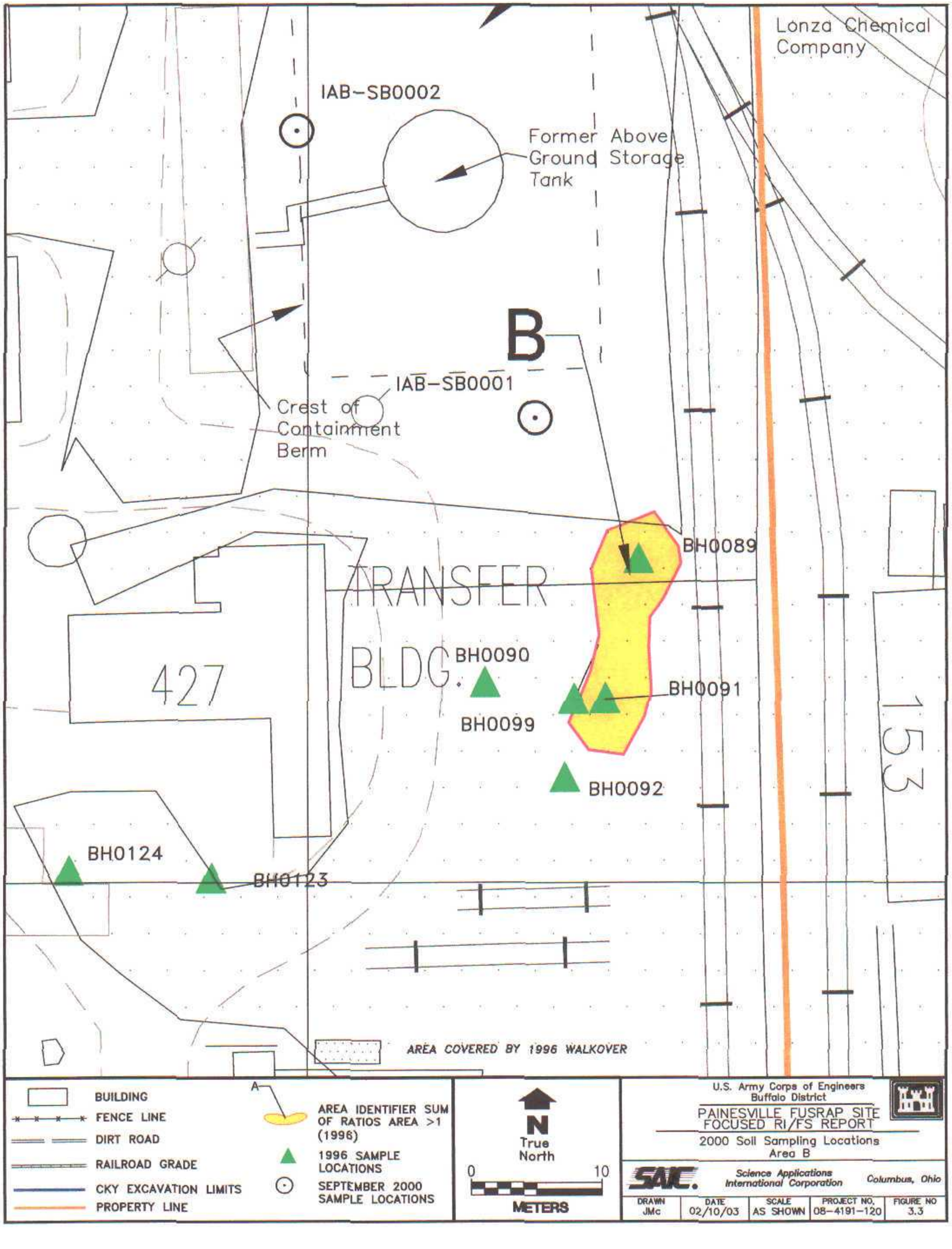
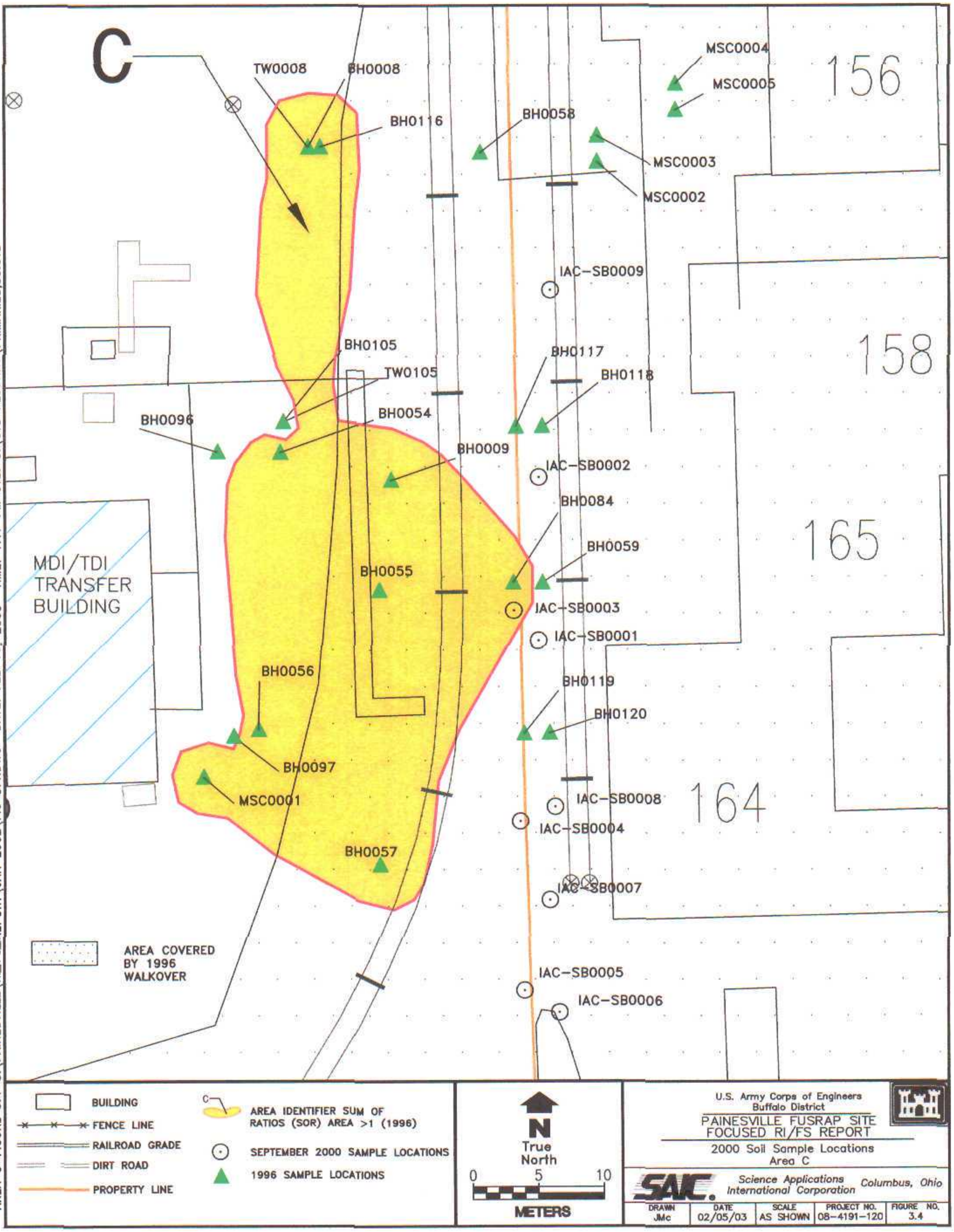


FIG. 3.3-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.3.DWG DATE: FEB 10, 2003 1:28 PM CTB: S:\CTB PLOTTING\PRIMARIES,30.CTB



AREA C-FIGURE 3.4-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.4.DWG DATE: FEB 2003 TIME: 1:17 PM CTB: S:\CTB PLOTTING\PRIMARIES,30.CTB

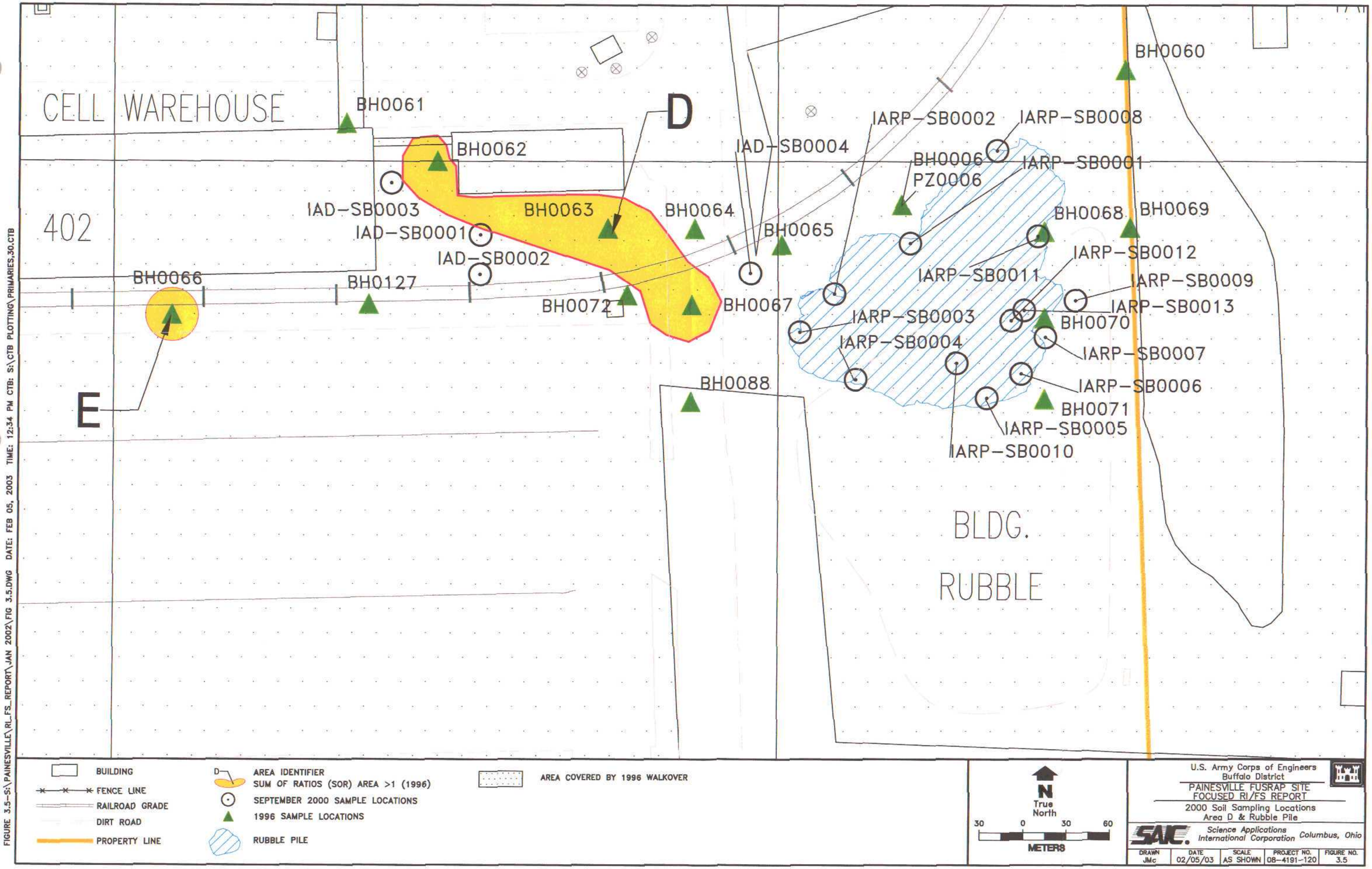
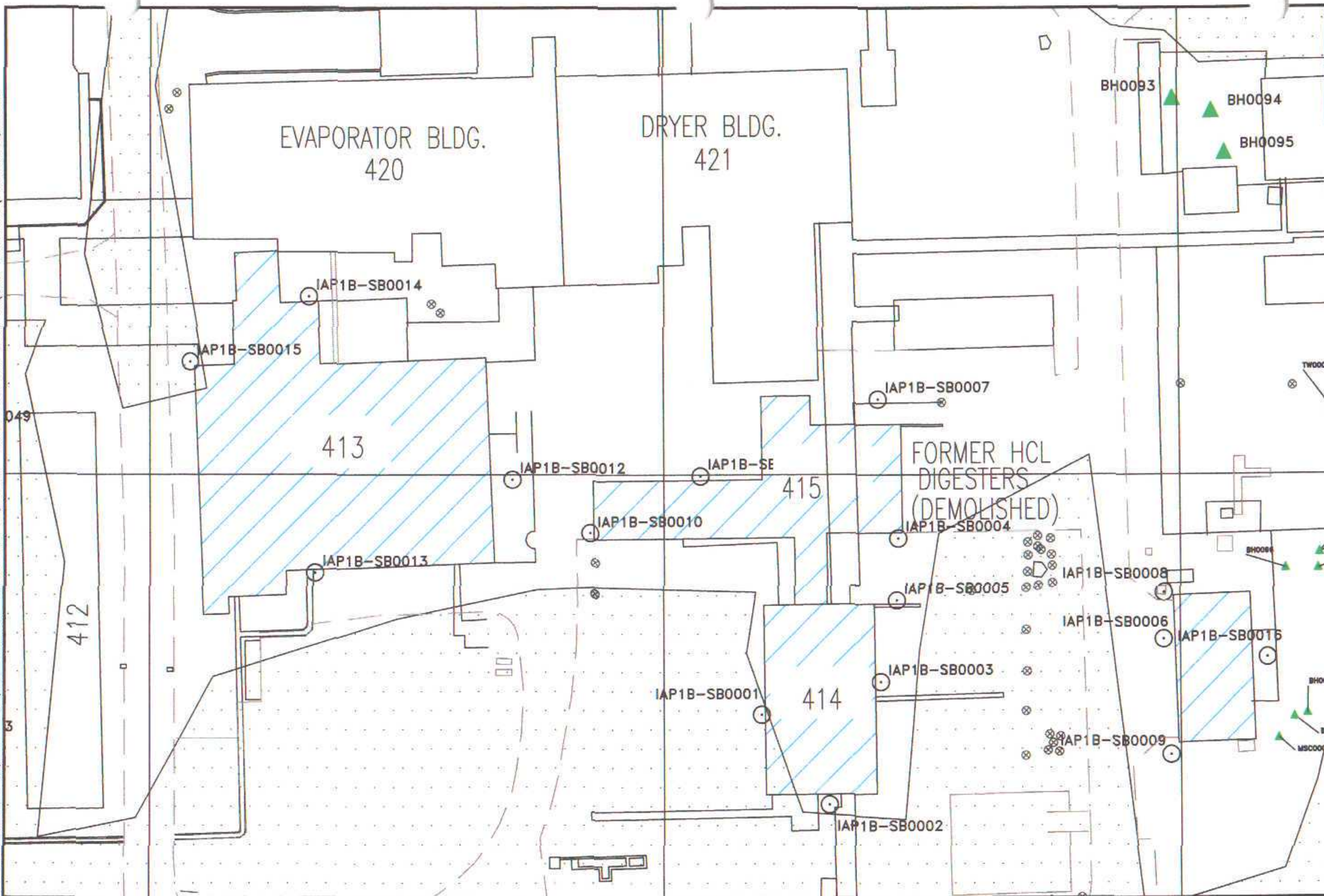


FIGURE 3.5-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.5.DWG DATE: FEB 05, 2003 TIME: 12:34 PM CTB: S:\CTB PLOTTING\PRIMARIES,30.CTB



BUILDING

FENCE LINE

DIRT ROAD

RAILROAD GRADE

AREA COVERED BY 1996 WALKOVER

SEPTEMBER 2000 SAMPLE LOCATIONS

POST 1950 BUILDINGS

1996 SAMPLE LOCATIONS

SOR (1996) 1 BOUNDARY

N
True
North

10 0 10 20
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

2000 Soil Sampling Locations
Post 1950 Buildings

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/05/03	AS SHOWN	08-4191-120	3.6

FIGURE 3.6-S:\PAINESVILLE\RL_FS_REPORT\JAN 2002\FIG 3.6.DWG DATE: FEB 06, 2003 TIME: 7:04 AM CTB: S:\CTB PLOTTING\PRIMARIES,30.CTB

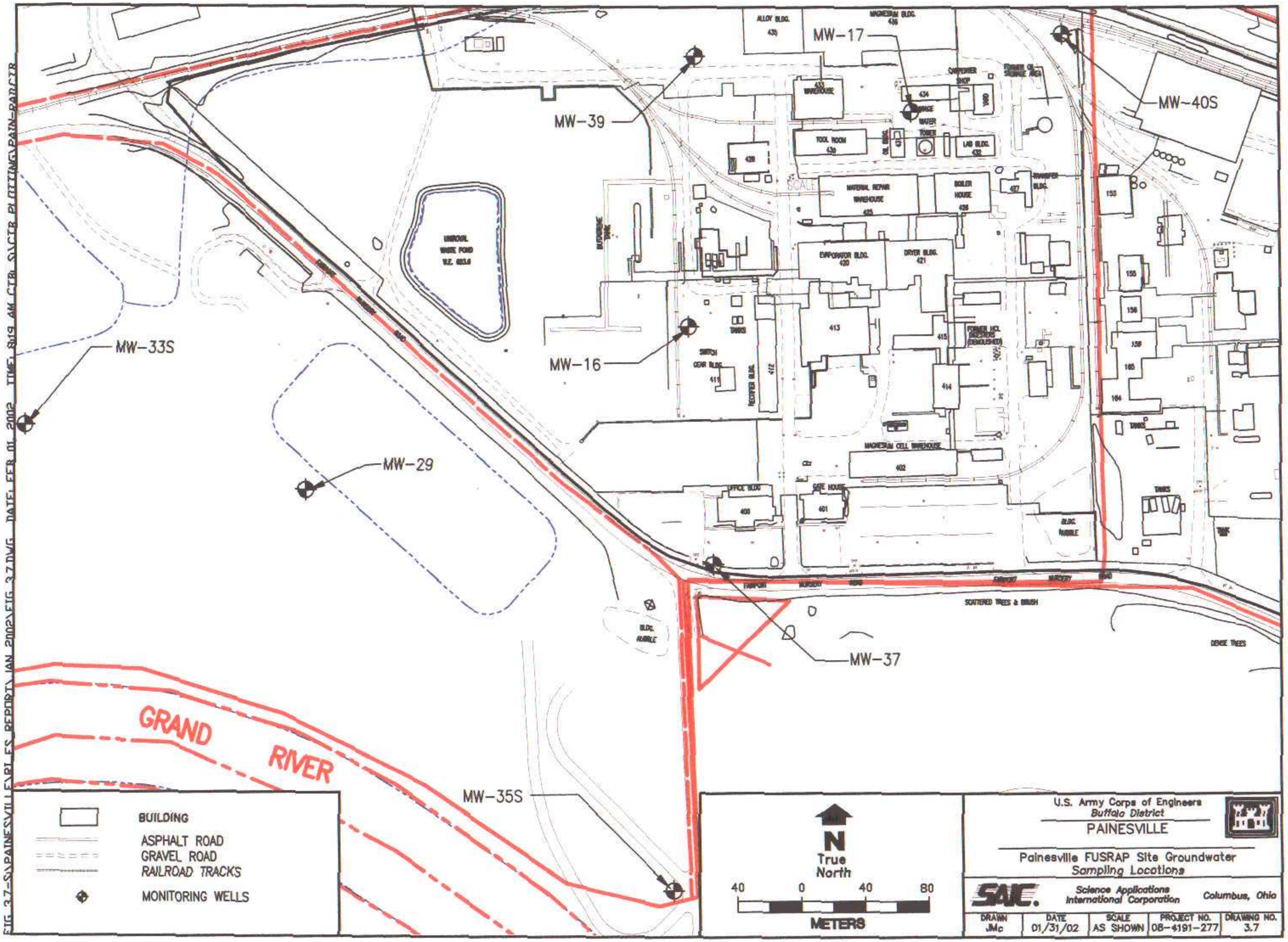


FIG 3.7-S:\PAINESVILLE\FILES REPORT\JAN 2002\FIG 3.7.DWG DATE: FEB 01, 2002 TIME: 8:19 AM CTB: S:\CTB PLOTTING\PAIN-PARCTB

BUILDING	AREA IDENTIFIER SOR >1 (1996 RESULT)	AREA COVERED BY 1996 WALKOVER
FENCE LINE	0–11,000 CPM	
TREELINE	11,000–16,000 CPM	
RAILROAD GRADE	16,000–22,000 CPM	
UTILITY LIGHT POLE	22,000–28,000 CPM	
	28,000–500,000 CPM	

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

2000 Gamma Walkover Survey Results
Areas A, H, and I NaI on Soil

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/05/03	AS SHOWN	08-4191-120	3.8

FIG 3.8–S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.8.DWG DATE: FEB 10, 2003 TIME: 1:05 PM CTB: S:\CTB PLOTTING\PAINE_CPM.CTB

	BUILDING		AREA IDENTIFIER SOR >1 (1996 RESULT)	AREA COVERED BY 1996 WALKOVER
	FENCE LINE		0–11,000 CPM	
	TREELINE		11,000–16,000 CPM	
	RAILROAD GRADE		16,000–22,000 CPM	
	UTILITY LIGHT POLE		22,000–28,000 CPM	
			28,000–500,000 CPM	

N
True North

12.5 0 12.5 25
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

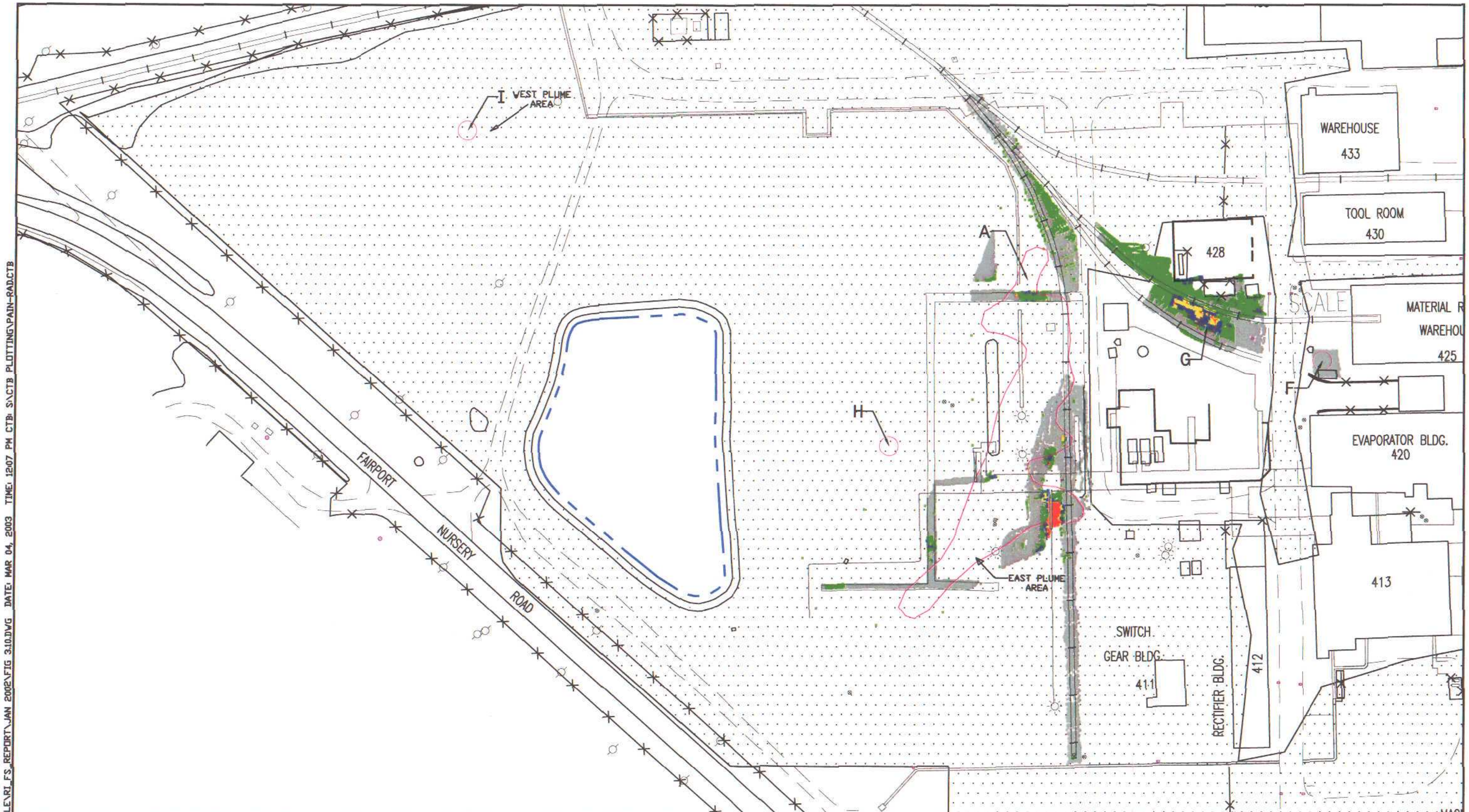
2000 Gamma Walkover Survey Results
Areas A, H, and I FIDLER on Soil

SAIC. Science Applications International Corporation — Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/10/03	AS SHOWN	08-4191-120	3.9

FIG 3.9-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.9.DWG DATE: MAR 04, 2003 TIME: 11:13 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

FIG 3.10-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.10.DWG DATE: MAR 04, 2003 TIME: 12:07 PM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB



	BUILDING
	FENCE LINE
	TREELINE
	RAILROAD GRADE
	UTILITY LIGHT POLE
	AREA IDENTIFIER SOR >1 (1996 RESULT)
	4,000–10,000 CPM
	10,000–15,000 CPM
	15,000–20,000 CPM
	20,000–25,000 CPM
	25,000–300,000 CPM
	AREA COVERED BY 1996 WALKOVER

N
True North

15 0 15 30
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

2000 Gamma Walkover Survey Results
Areas A, G, and F NaI on Asphalt/Gravel

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/10/03	AS SHOWN	06-4191-120	3.10

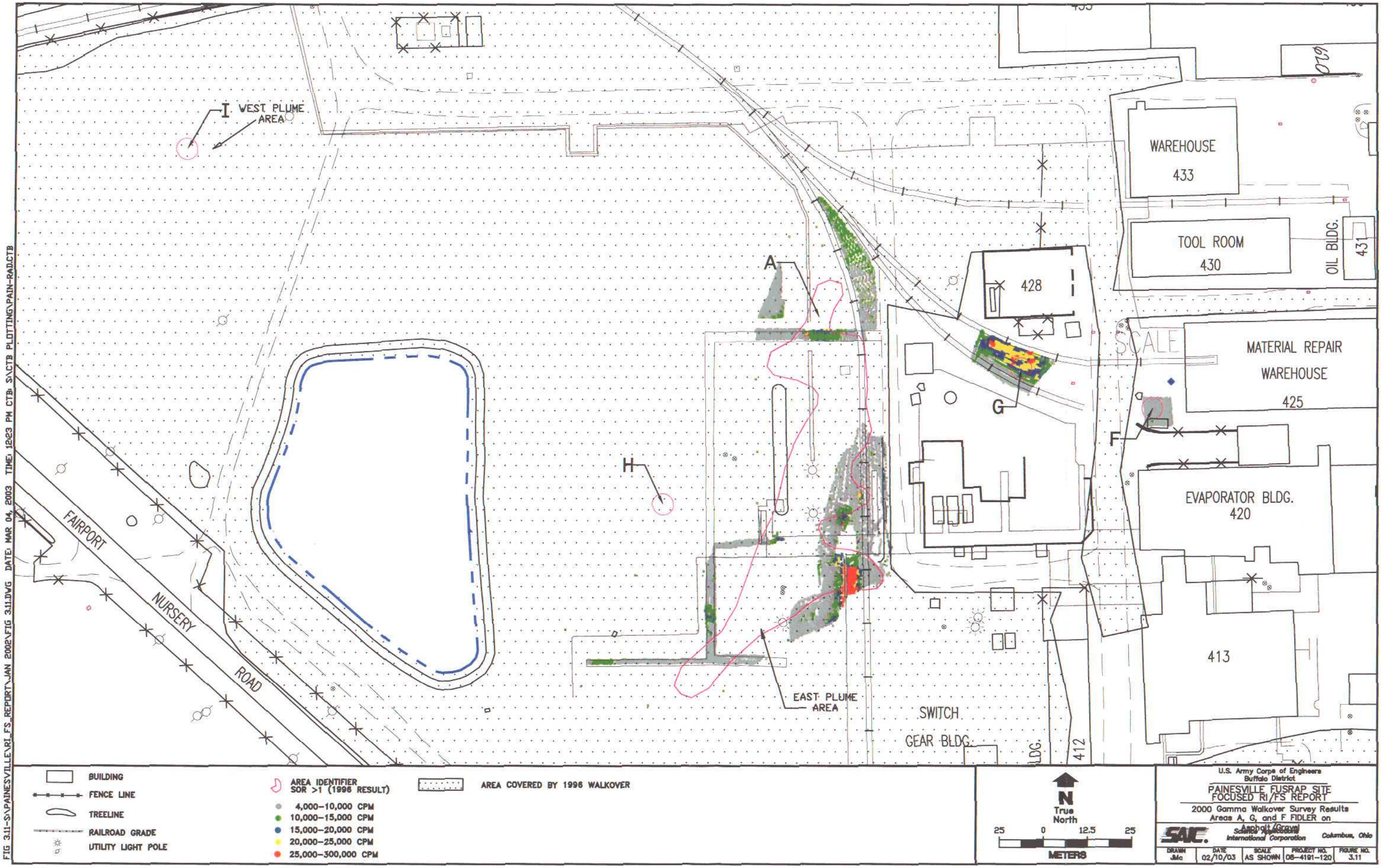
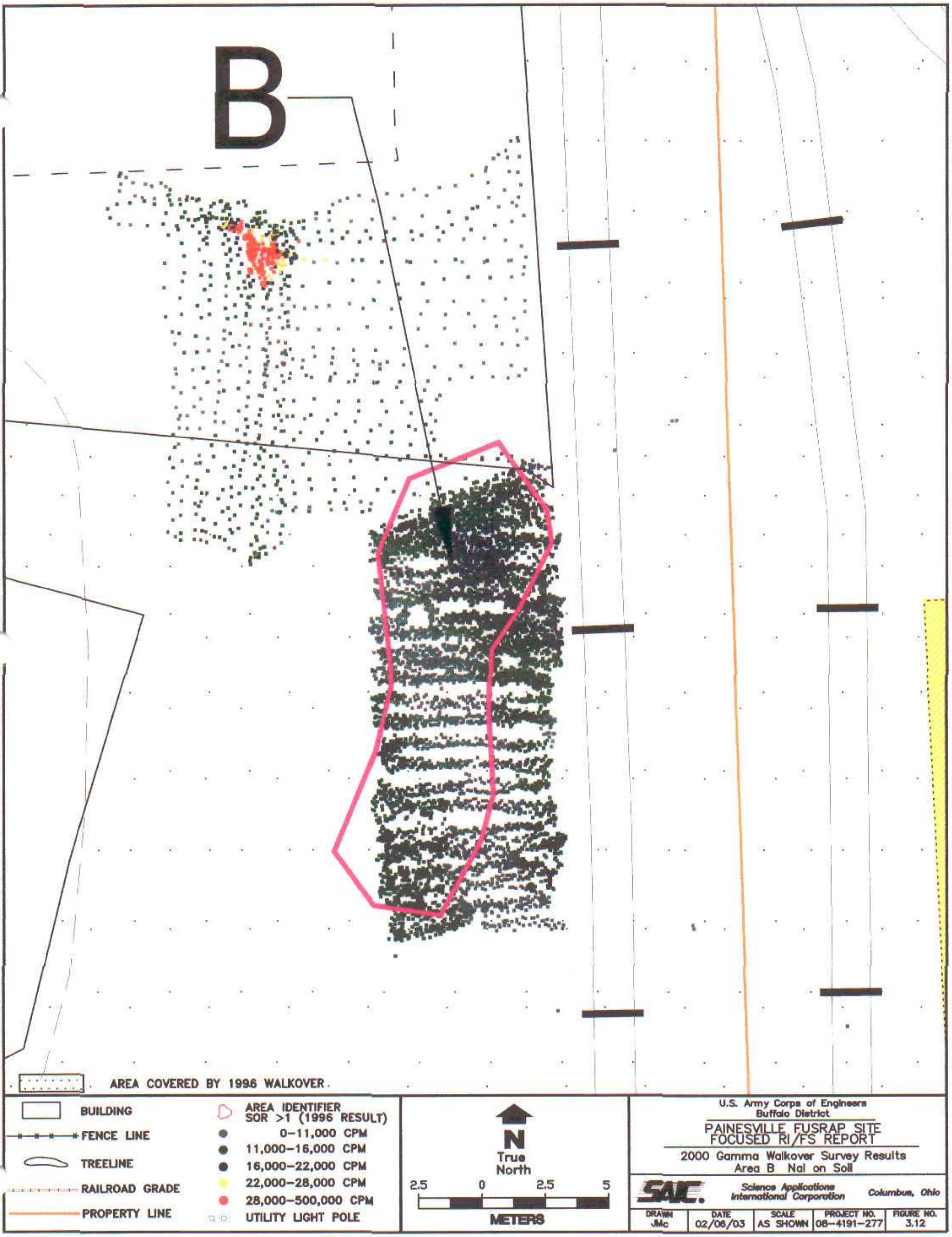
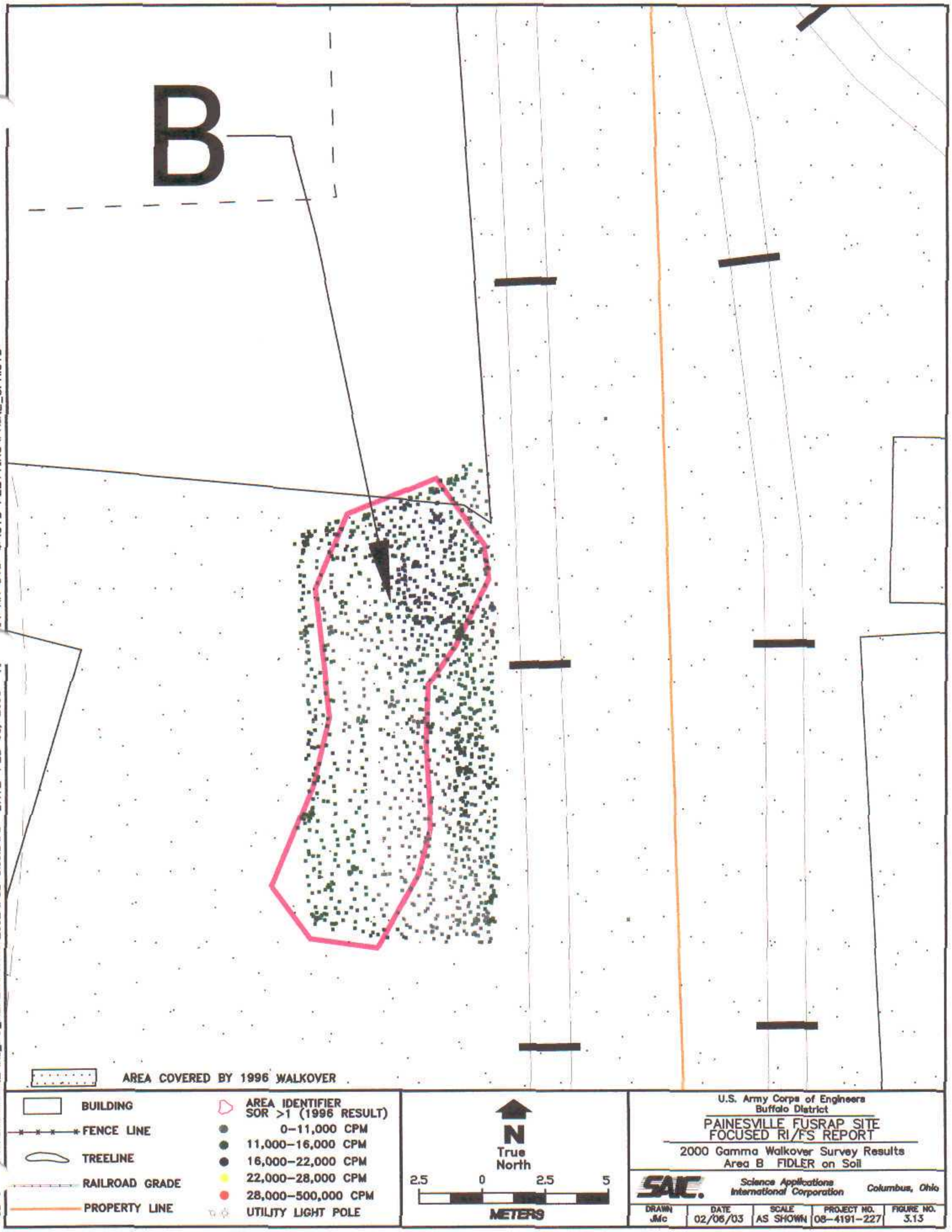


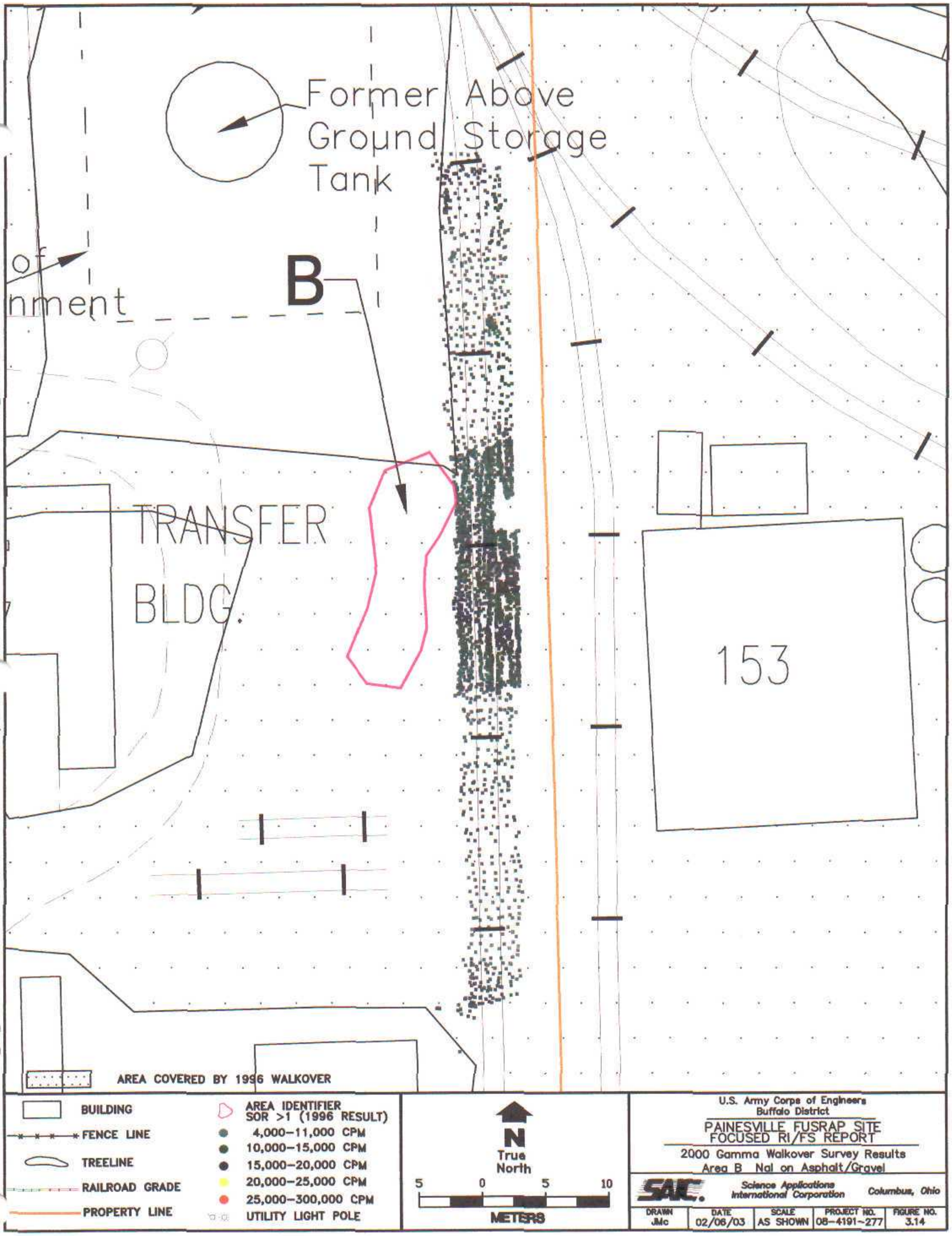
FIG 3.11-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.11.DWG DATE: MAR 04, 2003 TIME: 12:23 PM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

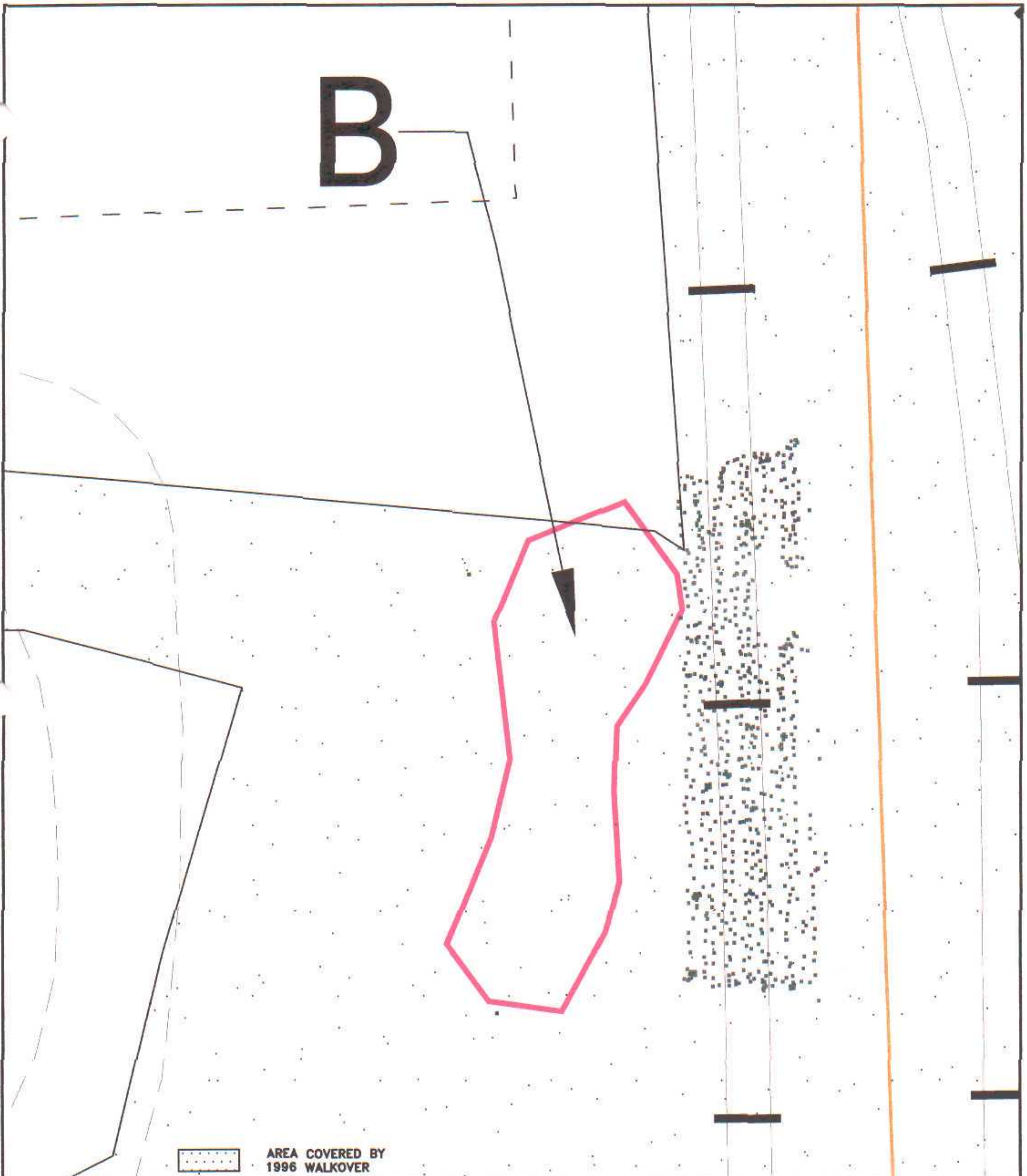
FIG 3 \PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.12.DWG DATE: FEB 06, 2003 TI 00 AM CTB: S:\CTB PLOTTING\PAINE_CPM.CTB





B
AREA COVERED BY 1996 WALKOVER
BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
PROPERTY LINE
AREA IDENTIFIER SOR >1 (1996 RESULT)
0-11,000 CPM
11,000-16,000 CPM
16,000-22,000 CPM
22,000-28,000 CPM
28,000-500,000 CPM
UTILITY LIGHT POLE
N
True North
2.5 0 2.5 5
METERS
U.S. Army Corps of Engineers
Buffalo District
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT
2000 Gamma Walkover Survey Results
Area B FIDLER on Soil
SAIC.
Science Applications International Corporation
Columbus, Ohio
DRAWN JMc
DATE 02/06/03
SCALE AS SHOWN
PROJECT NO. 08-4191-227
FIGURE NO. 3.13
FIG 3.13.DWG DATE: FEB 06, 2003 S:\CTB PLOTTING\PAINE_CPM.CTB


Former Above
Ground Storage
Tank
of
nment
B
TRANSFER
BLDG.
153
AREA COVERED BY 1996 WALKOVER
BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
PROPERTY LINE
AREA IDENTIFIER SOR >1 (1996 RESULT)
4,000–11,000 CPM
10,000–15,000 CPM
15,000–20,000 CPM
20,000–25,000 CPM
25,000–300,000 CPM
UTILITY LIGHT POLE
N
True North
5 0 5 10
METERS
U.S. Army Corps of Engineers
Buffalo District
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT
2000 Gamma Walkover Survey Results
Area B NaI on Asphalt/Gravel
SAIC
Science Applications International Corporation
Columbus, Ohio
DRAWN JMc
DATE 02/06/03
SCALE AS SHOWN
PROJECT NO. 08-4191-277
FIGURE NO. 3.14
14-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.14.DWG DATE: FEB 06, 2003 E: 9:18 AM CTB: S:\CTB PLOTTING\PAINE_CPM.CTB



LEGEND		
BUILDING	AREA IDENTIFIER SOR >1 (1996 RESULT)	N True North
FENCE LINE	4,000–10,000 CPM	
TREELINE	10,000–15,000 CPM	
RAILROAD GRADE	15,000–20,000 CPM	2.5 0 2.5 5
PROPERTY LINE	20,000–25,000 CPM	METERS
	25,000–300,000 CPM	
	UTILITY LIGHT POLE	

U.S. Army Corps of Engineers
Buffalo District

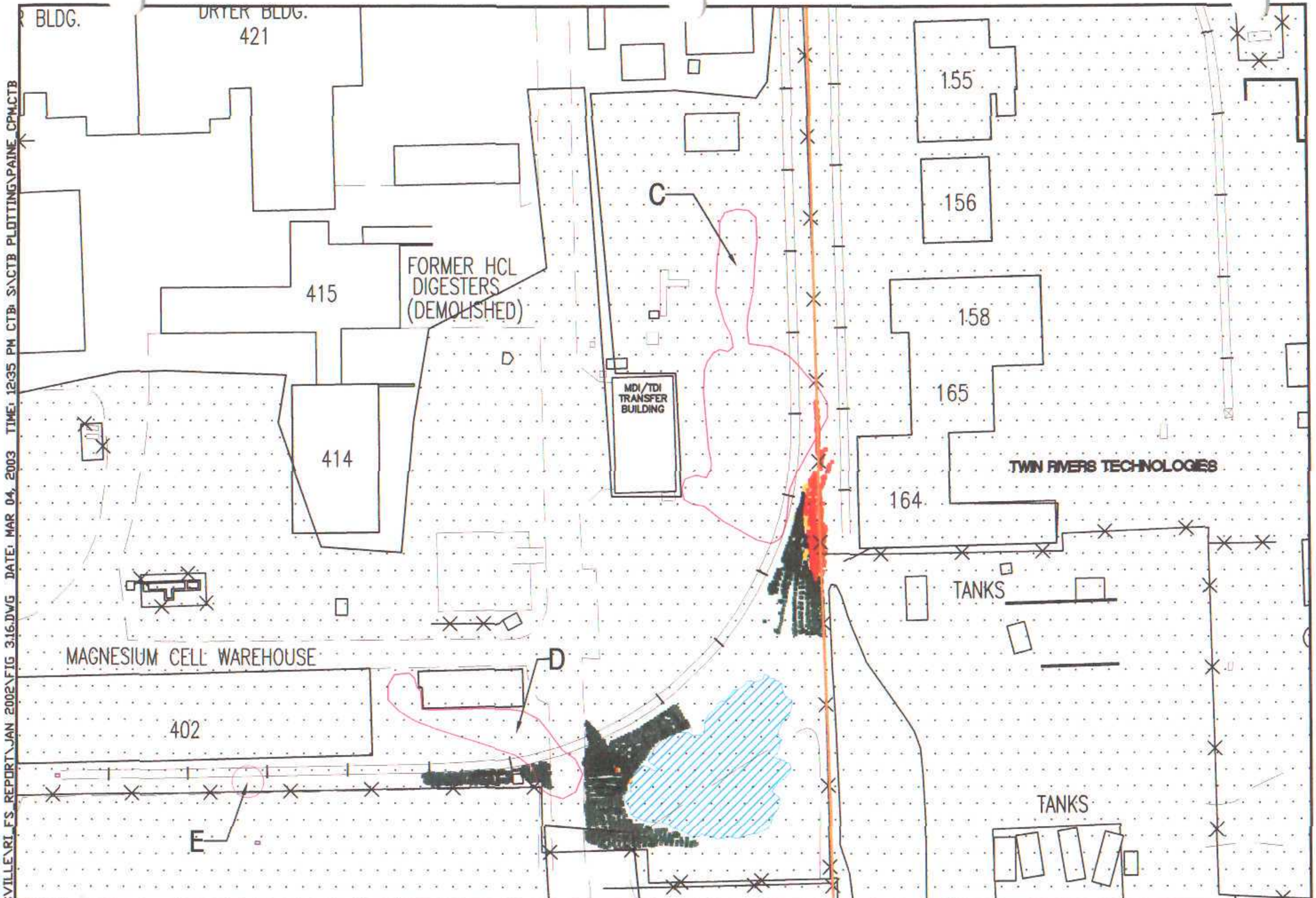
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

2000 Gamma Walkover Survey Results
Area B FIDLER on Asphalt/Gravel

SAIC. Science Applications International Corporation — Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/06/03	AS SHOWN	08-4191-277	3.15

F:\ S-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.15.DWG DATE: FEB 06, 2003 9:25 AM CTB: S:\CTB PLOTTING\PAINE_CPM.CTB



BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
UTILITY LIGHT POLE
RUBBLE PILE

AREA IDENTIFIER
SOR >1 (1996 RESULT)
0–11,000 CPM
11,000–16,000 CPM
16,000–22,000 CPM
22,000–28,000 CPM
28,000–500,000 CPM

AREA COVERED BY 1996 WALKOVER
PROPERTY LINE

N
True North

12.5 0 12.5 25
METERS

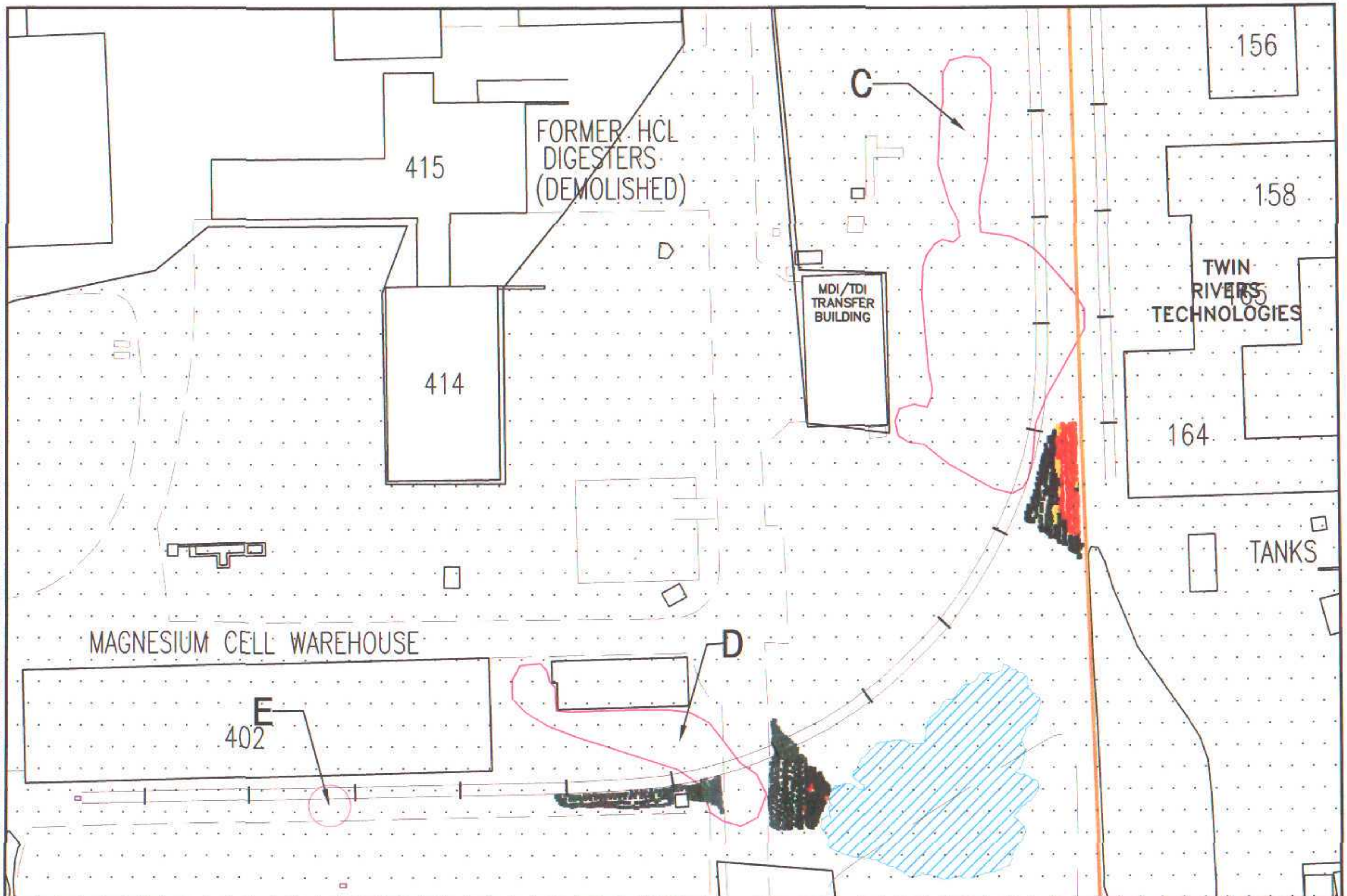
U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

2000 Gamma Walkover Survey Results
Areas C, D, and E NaI on Soil

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/06/03	AS SHOWN	06-4191-227	3.16



BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
UTILITY LIGHT POLE
RUBBLE PILE
AREA IDENTIFIER SOR >1 (1996 RESULT)
0–11,000 CPM
11,000–16,000 CPM
16,000–22,000 CPM
22,000–28,000 CPM
28,000–500,000 CPM
AREA COVERED BY 1996 WALKOVER
PROPERTY LINE

N
True North

10 0 10 20
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

2000 Gamma Walkover Survey Results
Areas C, D, and E FIDLER on Soil

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/06/03	AS SHOWN	06-4191-227	3.17

FIG 3.17-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.17.DWG DATE: MAR 04, 2003 TIME: 12:39 PM CTB: S:\CTB PLOTTING\PAINE_CPM.CTB

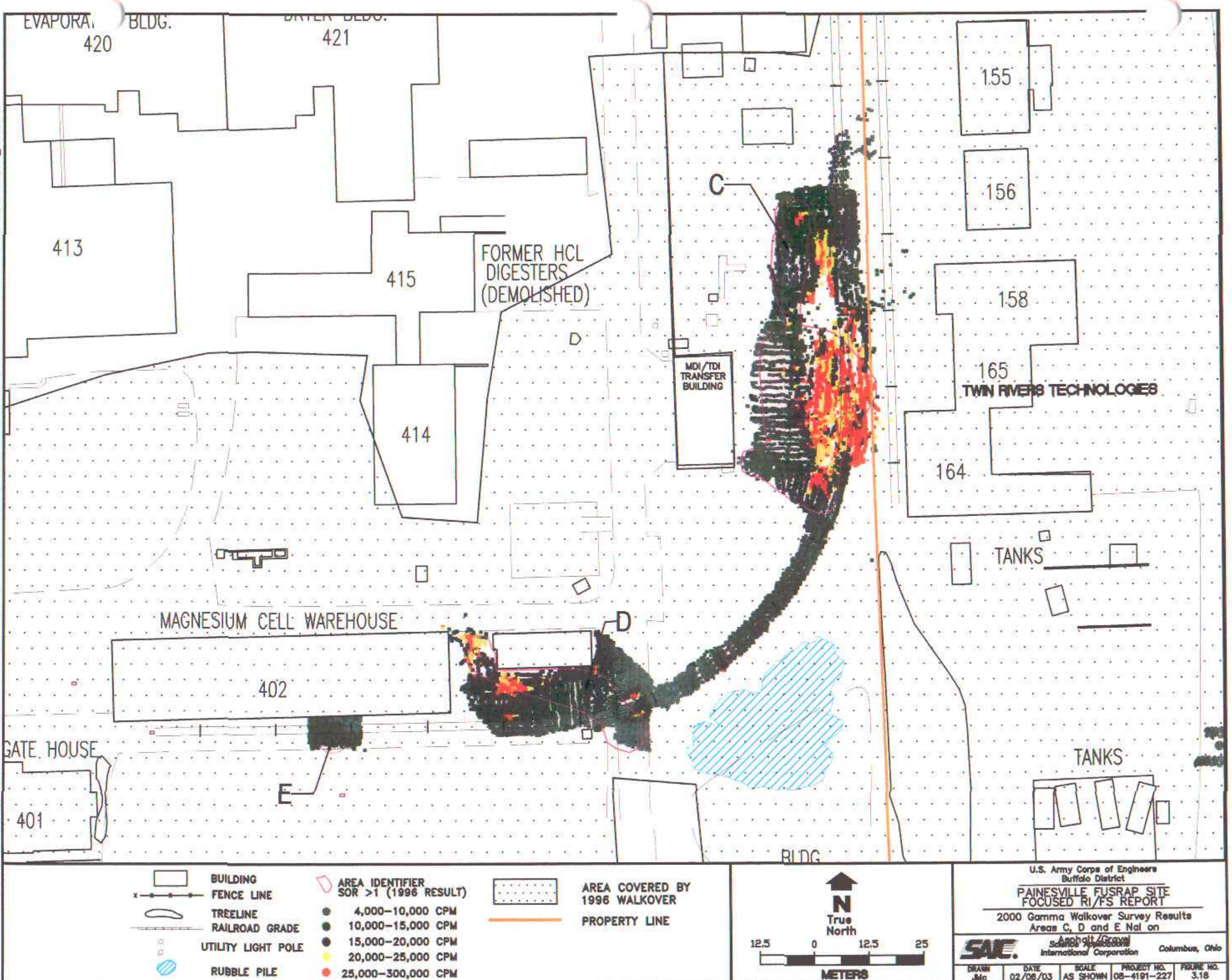


FIG 3.18-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.18.DWG DATE: MAR 04, 2003 TIME: 12:46 PM CTB: S:\CTB PLOTTING\PAINE_CPM.CTB

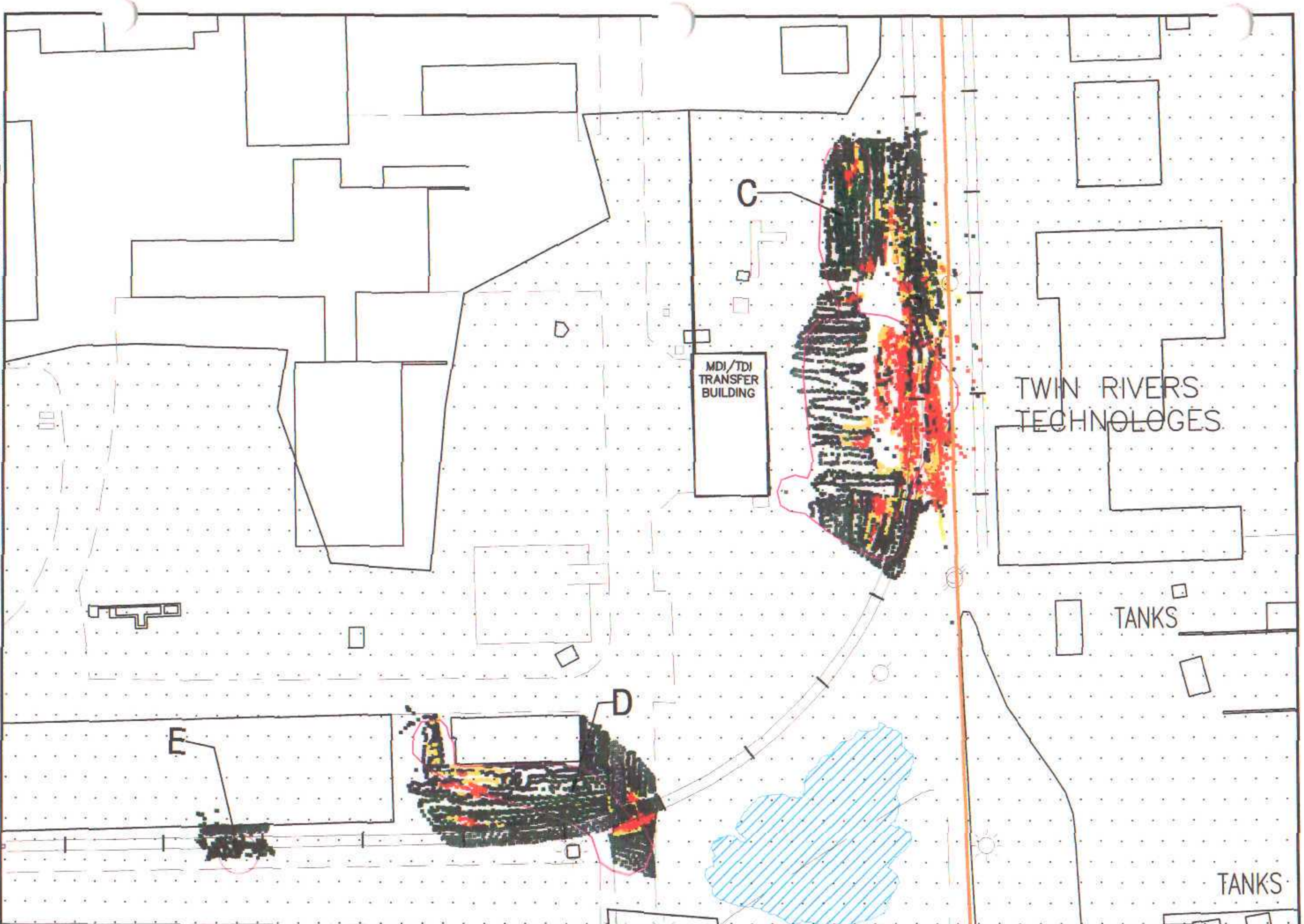
U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

2000 Gamma Walkover Survey Results
Areas C, D and E NaI on Asphalt/Gravel

SAIC. Science Applications International Corporation — Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/06/03	AS SHOWN	06-4191-227	3.18



Legend		Legend	
BUILDING		AREA IDENTIFIER SOR >1 (1996 RESULT)	
FENCE LINE		4,000–10,000 CPM	
TREELINE		10,000–15,000 CPM	
RAILROAD GRADE		15,000–20,000 CPM	
UTILITY LIGHT POLE		20,000–25,000 CPM	
RUBBLE PILE		25,000–300,000 CPM	

AREA COVERED BY 1996 WALKOVER

PROPERTY LINE

N
True North

10 0 10 20
METERS

U.S. Army Corps of Engineers
Buffalo District

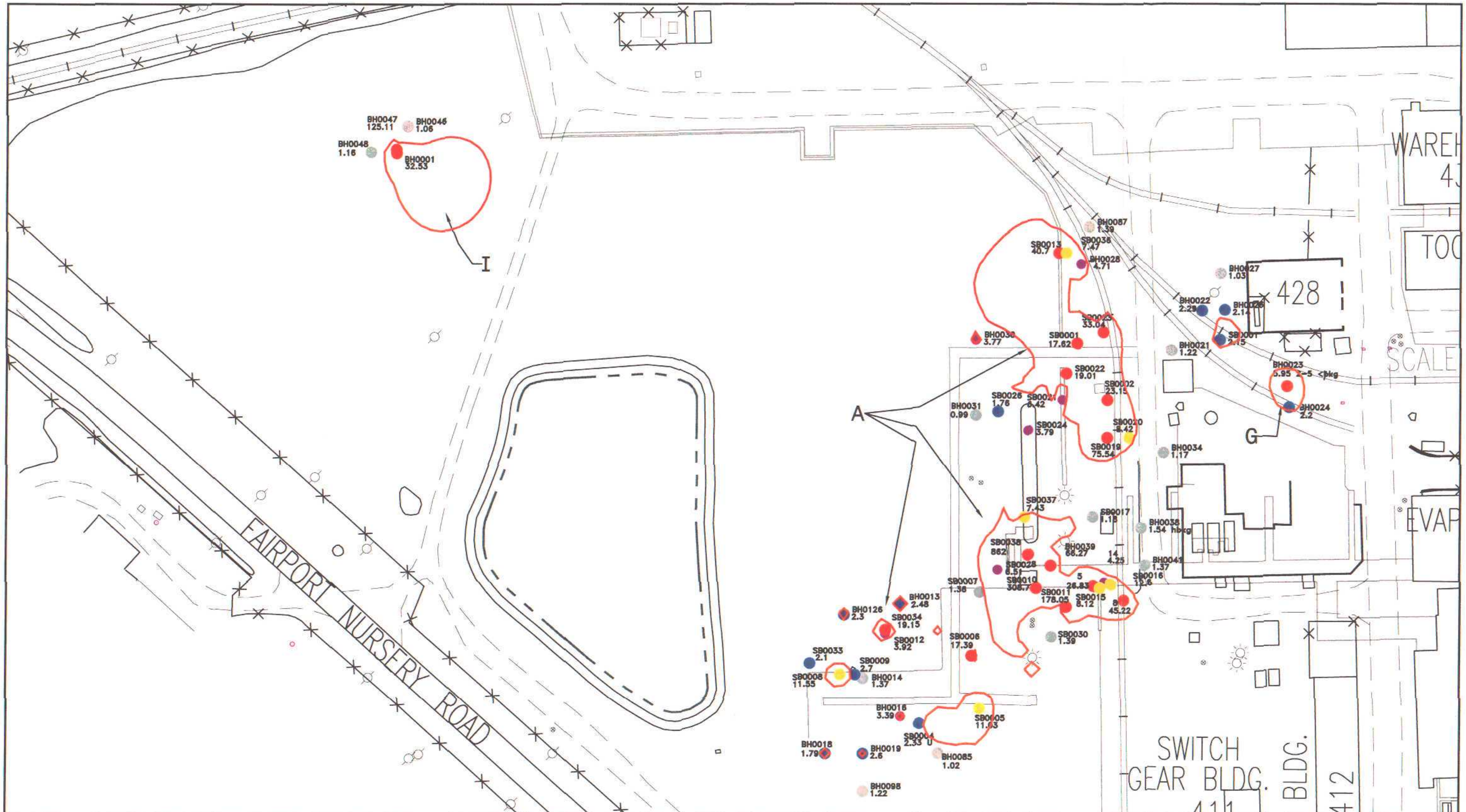
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

2000 Gamma Walkover Survey Results
Areas C, D, and E FIDLER on Asphalt/Gravel

SAIC. Science Applications International Corporation — Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
Jklc	02/10/03	AS SHOWN	08-4191-277	3.19

FIG 3.19-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 3.19.DWG DATE: MAR 04, 2003 TIME: 12:49 PM CTB: S:\CTB PLOTTING\PAINE_CPM.CTB



BUILDING	CONCENTRATION <BKG
FENCE LINE	CONCENTRATION 1–2 X BKG
TREELINE	CONCENTRATION 2–5 X BKG
RAILROAD GRADE	CONCENTRATION 5–10 X BKG
UTILITY LIGHT POLE	CONCENTRATION >10 X BKG

BH0018 = BORE HOLE ID 1.79 = CONCENTRATION pCi/g

SUBSISTENCE FARMER AREA IDENTIFIER SOR >1 (Based on 1998–2000 Results)

Note: Background Ra-226 = 1.42 pCi/g

N True North

12.5 0 12.5 25

METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Distribution of Radium-226 in Surface Soil
Areas A, I, and G

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/07/03	AS SHOWN	08-4191-120	4.1

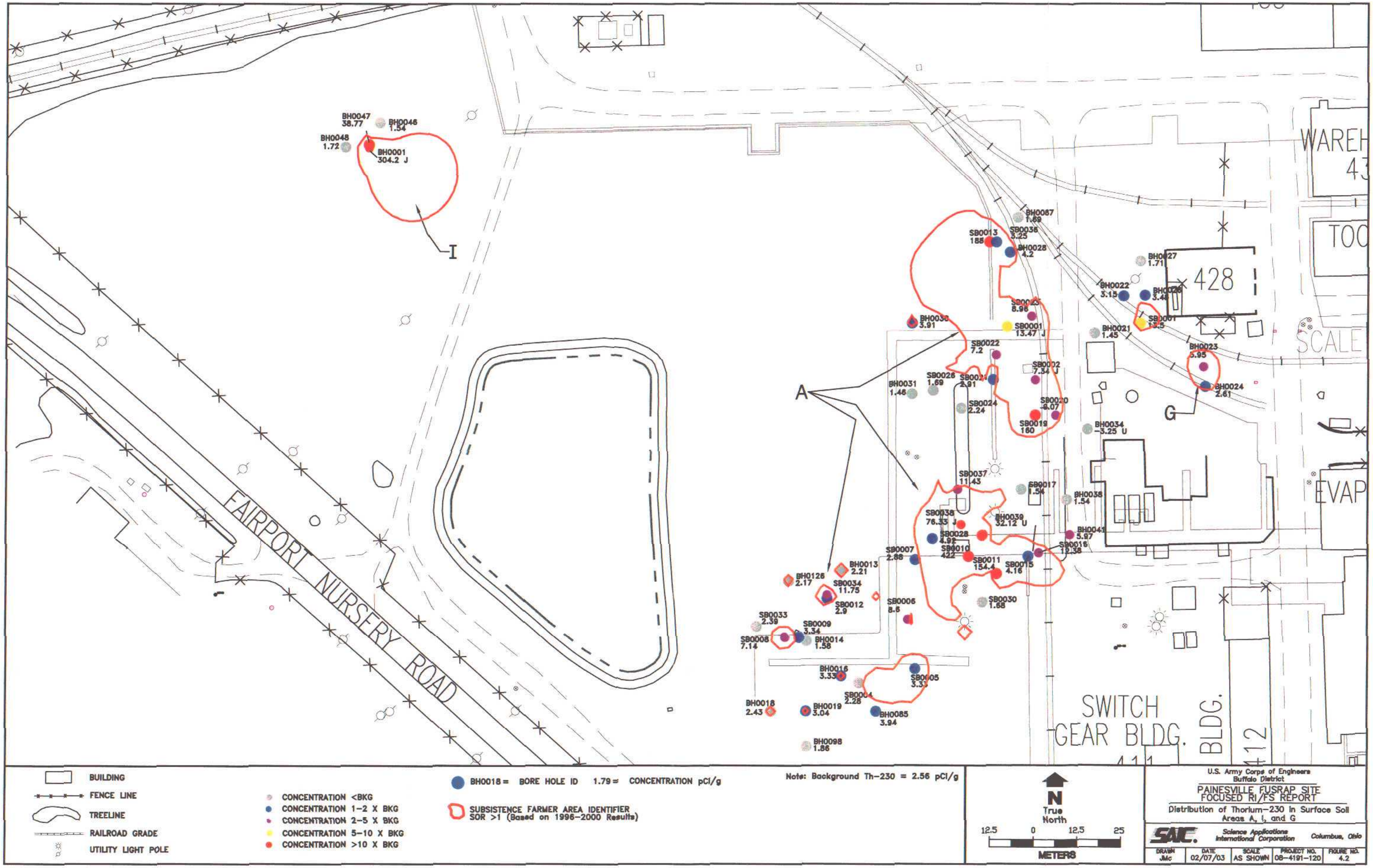
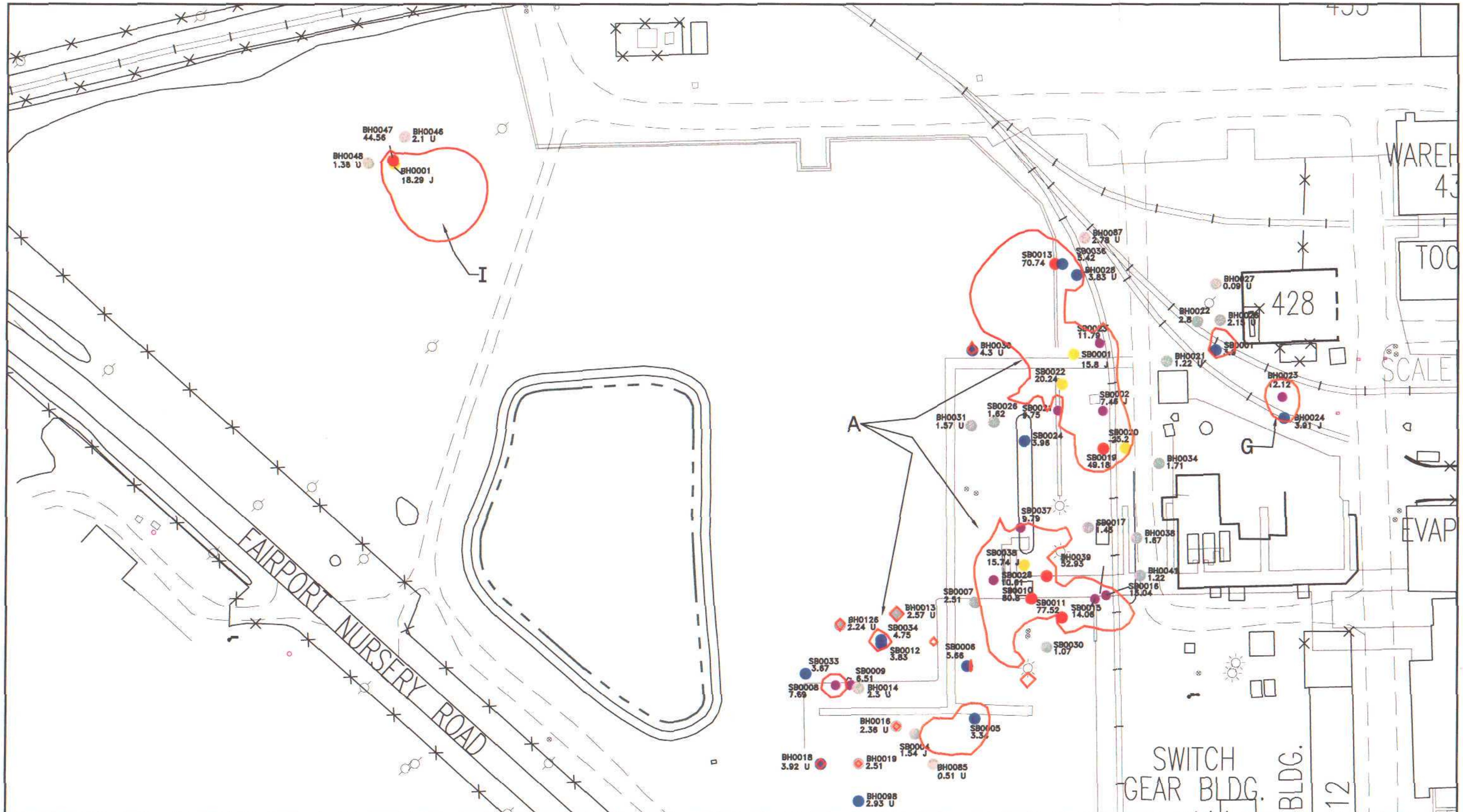


FIG 4.2-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.2.DWG DATE: MAY 05, 2003 TIME: 10:08 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB



BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
UTILITY LIGHT POLE

CONCENTRATION <BKG
CONCENTRATION 1–2 X BKG
CONCENTRATION 2–5 X BKG
CONCENTRATION 5–10 X BKG
CONCENTRATION >10 X BKG

BH0018 = BORE HOLE ID 1.79 = CONCENTRATION pCi/g

SUBSISTENCE FARMER AREA IDENTIFIER SOR >1 (Based on 1996–2000 Results)

Note: Background U-238 = 2.88 pCi/g

N True North

12.5 0 12.5 25
METERS

U.S. Army Corps of Engineers
Buffalo District

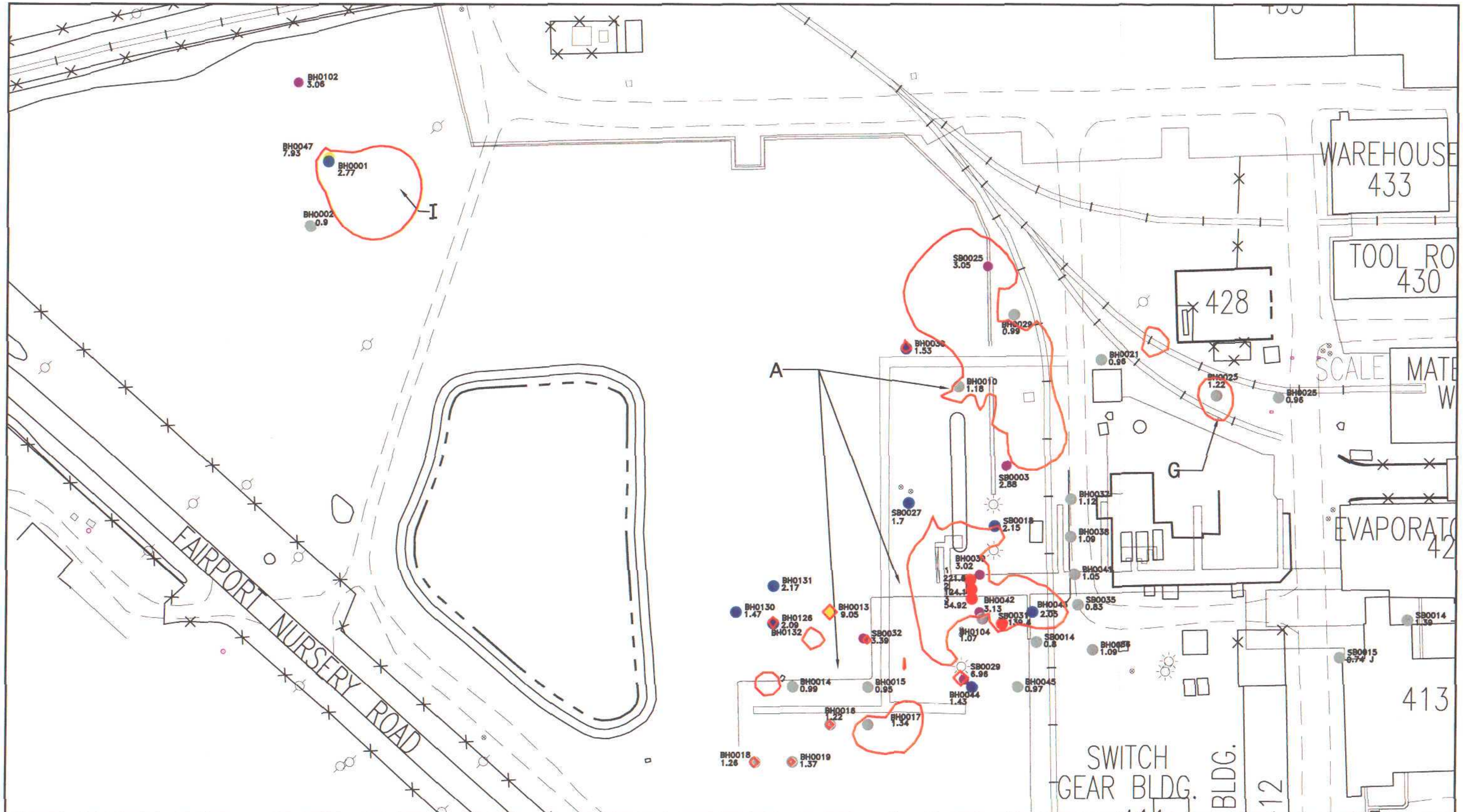
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Distribution of Uranium-238 in Surface Soil
Areas A, I, and G

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/07/03	AS SHOWN	08-4191-120	4.3

FIG 4.3-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.3.DWG DATE: MAY 05, 2003 TIME: 9:50 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB



▭	BUILDING
—x—x—x—	FENCE LINE
⌒	TREELINE
┄┄┄┄	RAILROAD GRADE
☼ ¤	UTILITY LIGHT POLE

- CONCENTRATION <BKG
- CONCENTRATION 1–2 X BKG
- CONCENTRATION 2–5 X BKG
- CONCENTRATION 5–10 X BKG
- CONCENTRATION >10 X BKG

BH0018 = BORE HOLE ID   1.79 = CONCENTRATION pCi/g

SUBSISTENCE FARMER AREA IDENTIFIER
SOR >1 (Based on 1996–2000 Results)

Note: Background Ra-226=1.42 pCi/g

N
True North

12.5 0 12.5 25
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

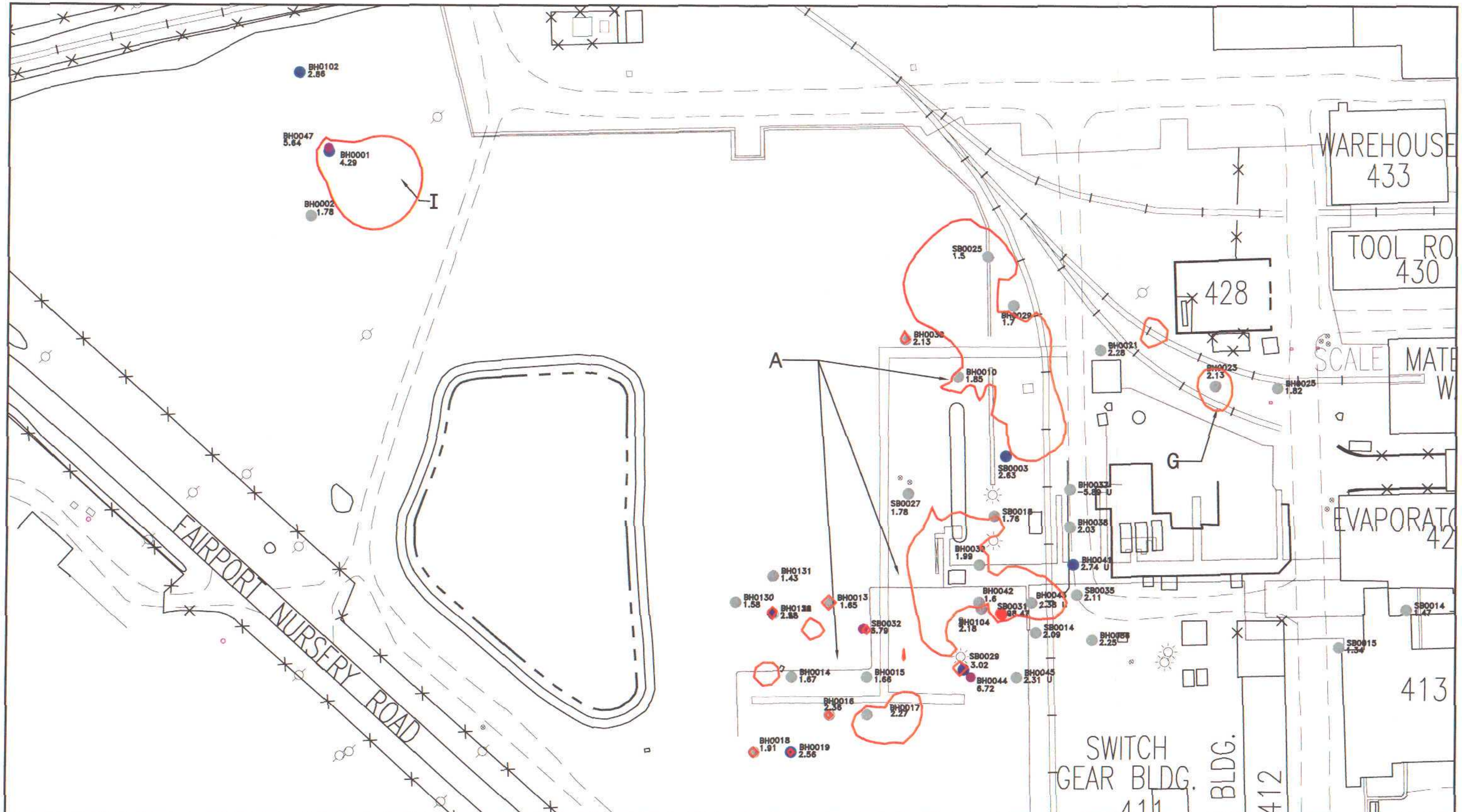
Distribution of Radium-226 in Subsurface Soil
Areas A, I, and G

SAIC. Science Applications International Corporation — Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/10/03	AS SHOWN	06-4191-120	4.4

FIG 4.4-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.4.DWG DATE: MAY 05, 2003 TIME: 9:45 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

FIG 4.5-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.5.DWG DATE: MAY 05, 2003 TIME: 9:42 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB



BUILDING

FENCE LINE

TREELINE

RAILROAD GRADE

UTILITY LIGHT POLE

CONCENTRATION <BKG

CONCENTRATION 1-2 X BKG

CONCENTRATION 2-5 X BKG

CONCENTRATION 5-10 X BKG

CONCENTRATION >10 X BKG

BH0018 = BORE HOLE ID 1.79 = CONCENTRATION pCi/g

SUBSISTENCE FARMER AREA IDENTIFIER SOR >1 (Based on 1996-2000 Results)

Note: Background Th-230 = 2.56 pCi/g

N True North

12.5 0 12.5 25

METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Distribution of Thorium-230 in Subsurface Soil
Areas A, I, and G

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/07/03	AS SHOWN	08-4191-277	4.5

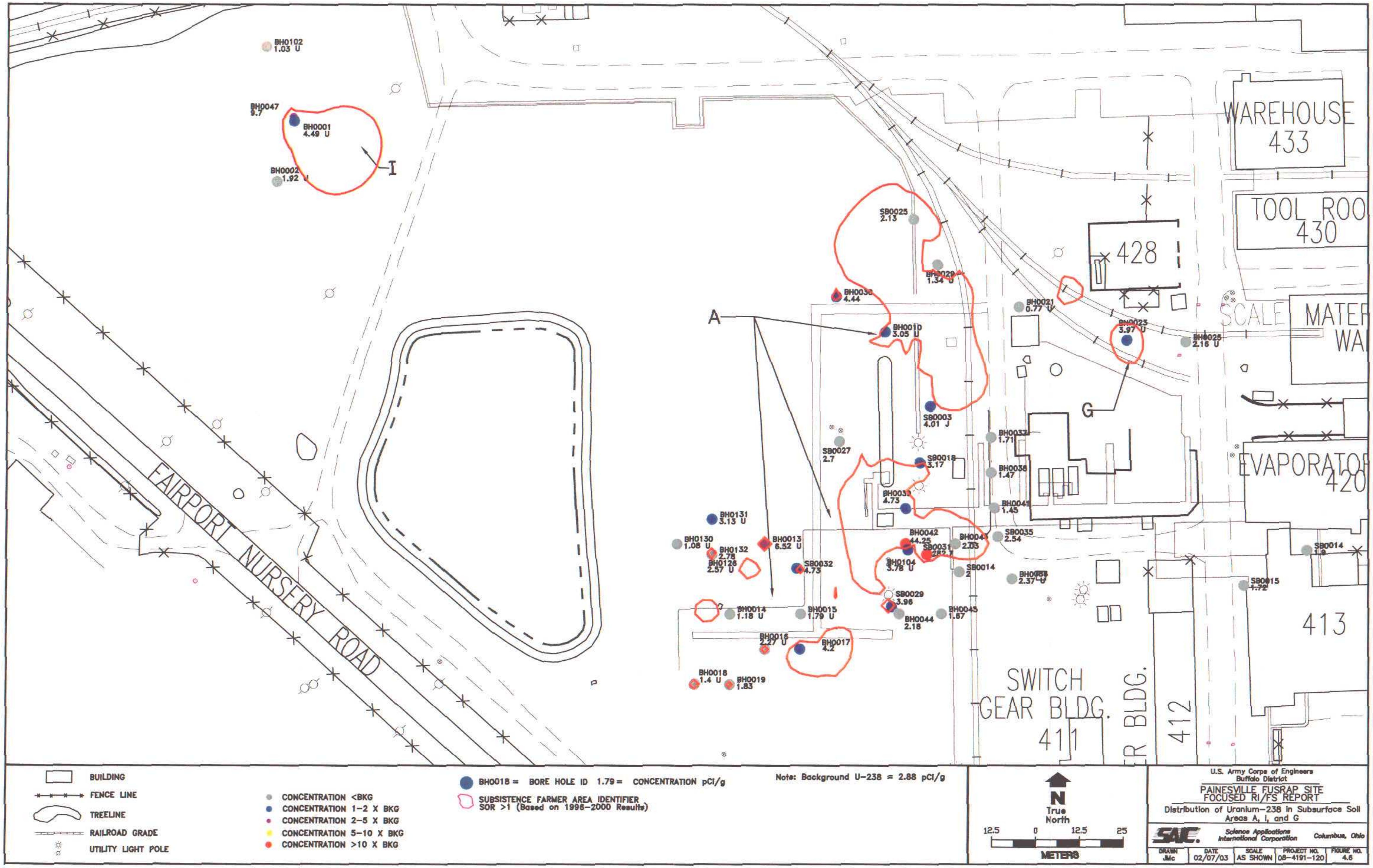
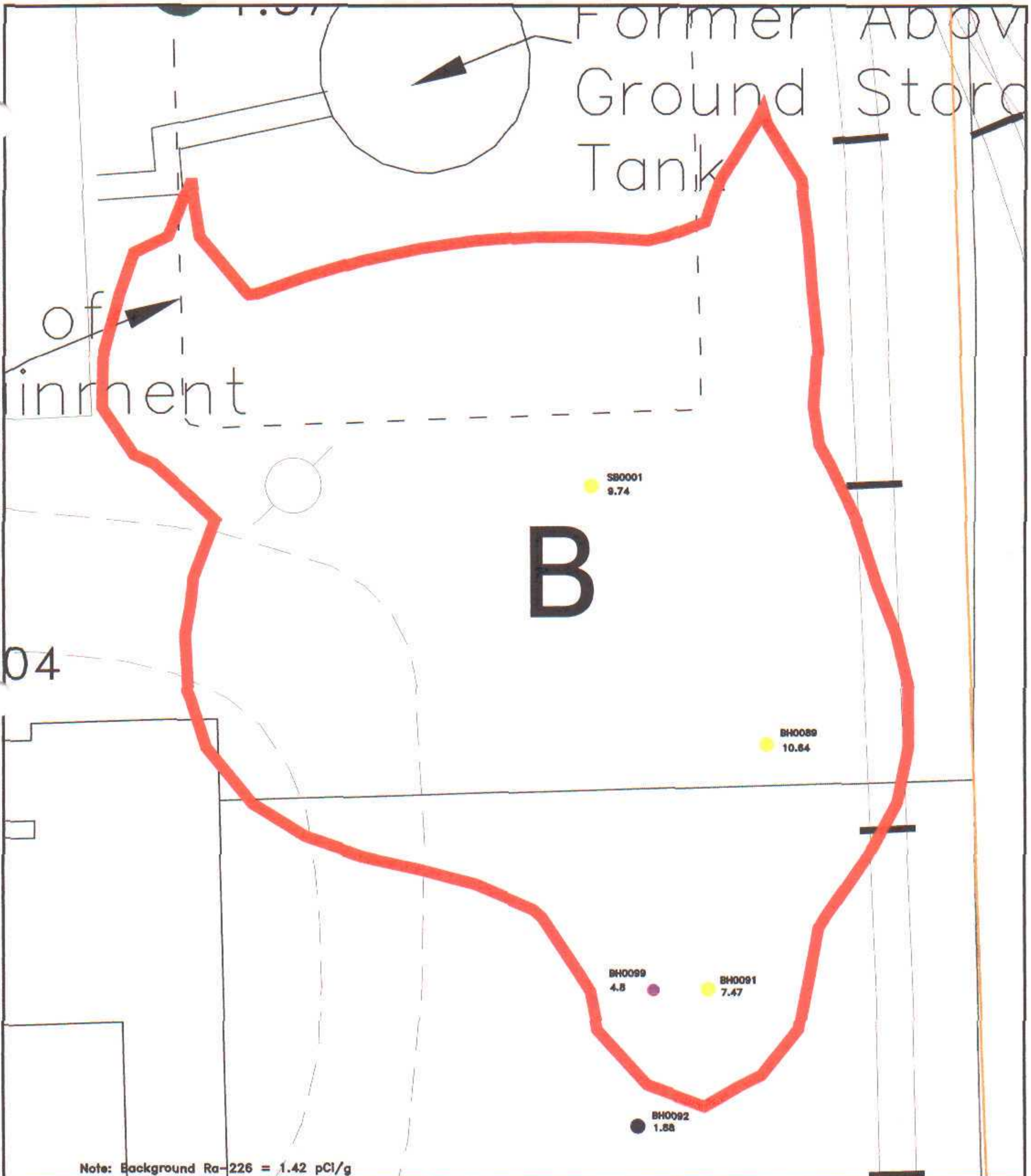


FIG 4.6-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.6.DWG DATE: MAY 05, 2003 TIME: 9:41 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

FIG 4.7-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.7.DWG DAT Y 05, 2003 TIME: 9:30 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB



BH0018 = BORE HOLE ID 1.79 = CONCENTRATION pCi/g

SUBSISTANCE FARMER AREA IDENTIFIER SOR >1 (Based on 1996-2000 Results)

BUILDING
FENCE LINE
PROPERTY LINE
RAILROAD GRADE
UTILITY LIGHT POLE

CONCENTRATION <BKG
CONCENTRATION 1-2 X BKG
CONCENTRATION 2-5 X BKG
CONCENTRATION 5-10 X BKG
CONCENTRATION >10 X BKG

N
True
North

3 0 3 6
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Distribution of Radium-226 in Surface Soil
Area B

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/07/03	AS SHOWN	08-4191-277	4.7

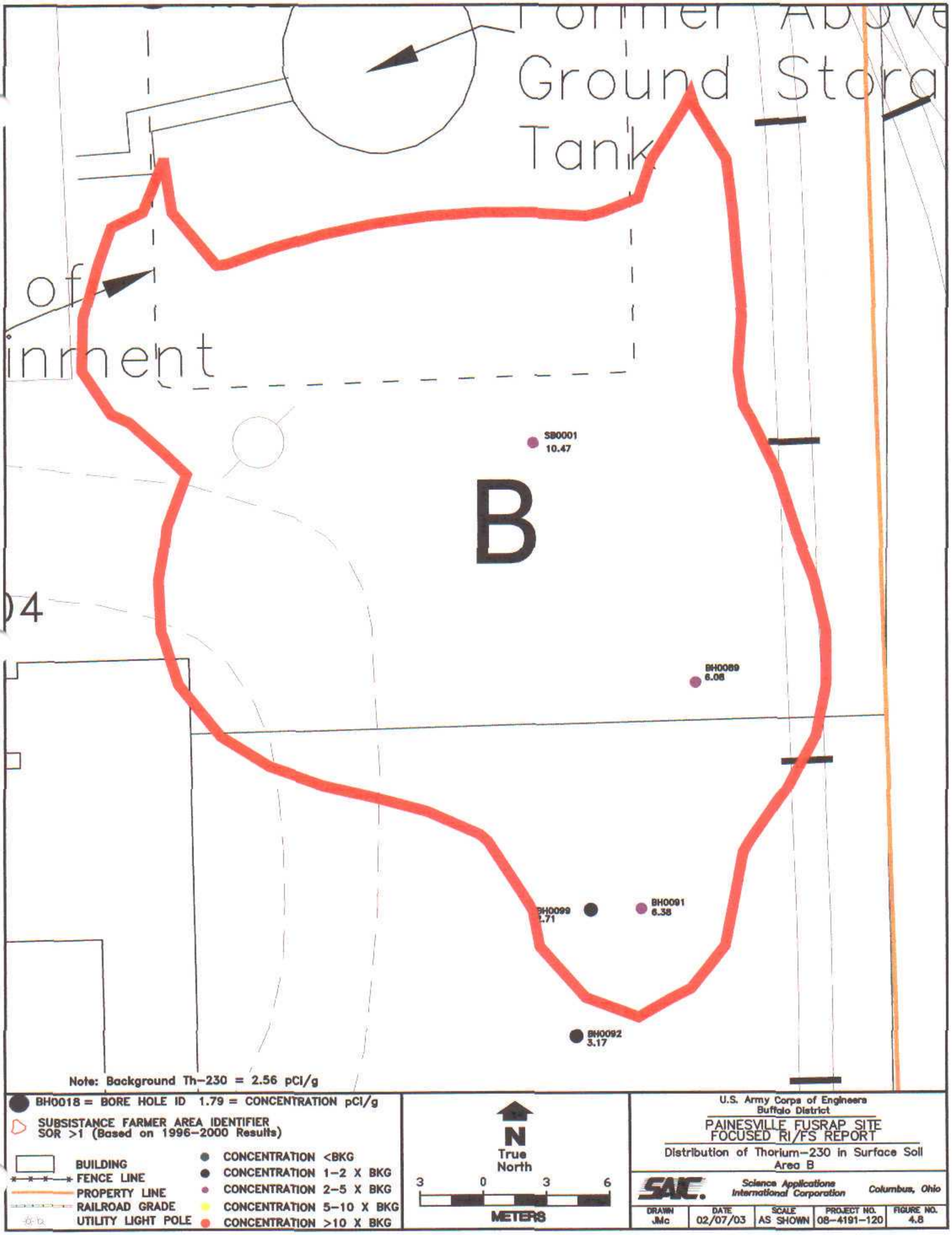


FIG 4 PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.8.DWG DATE: MAY 05, 2003 TIME AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

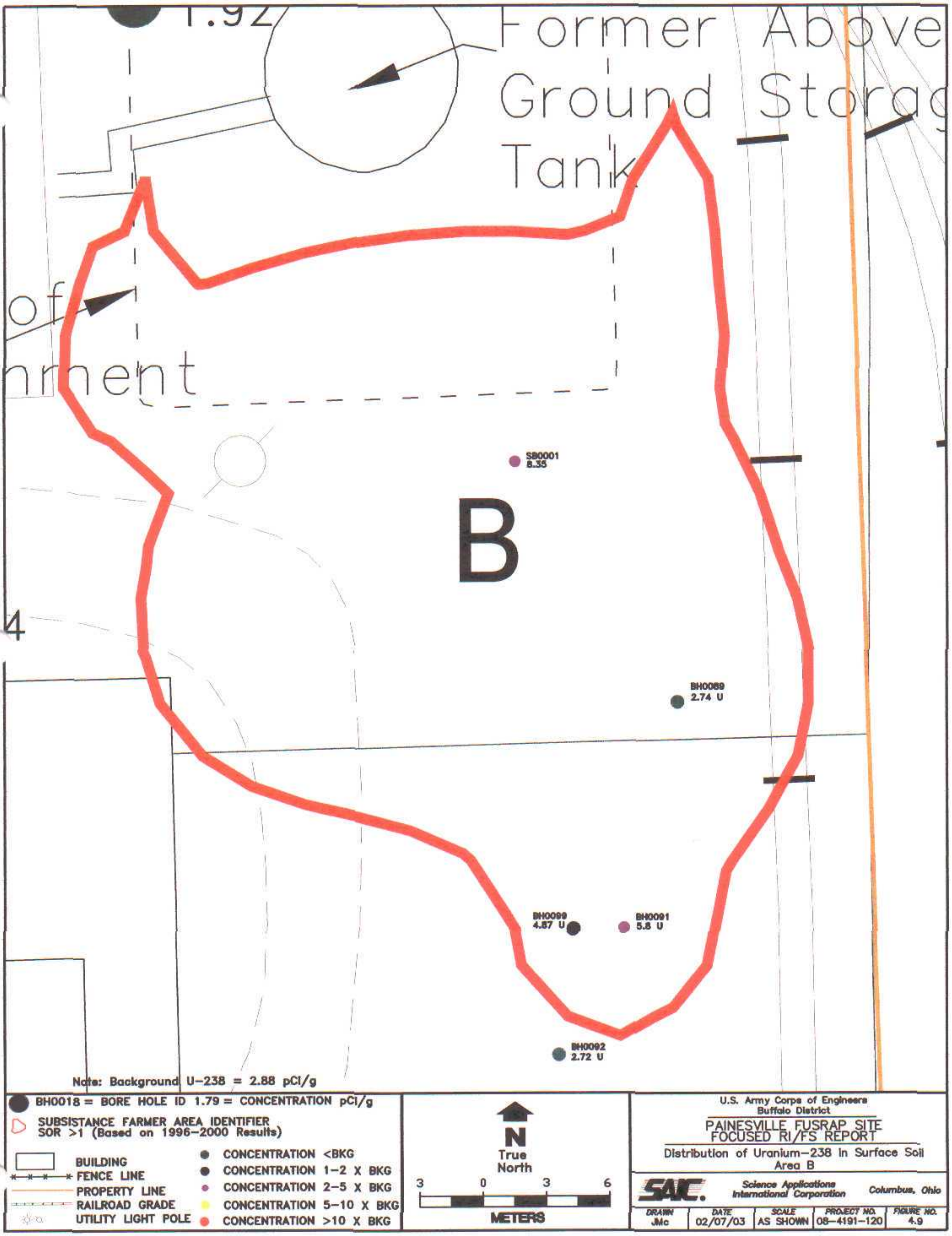
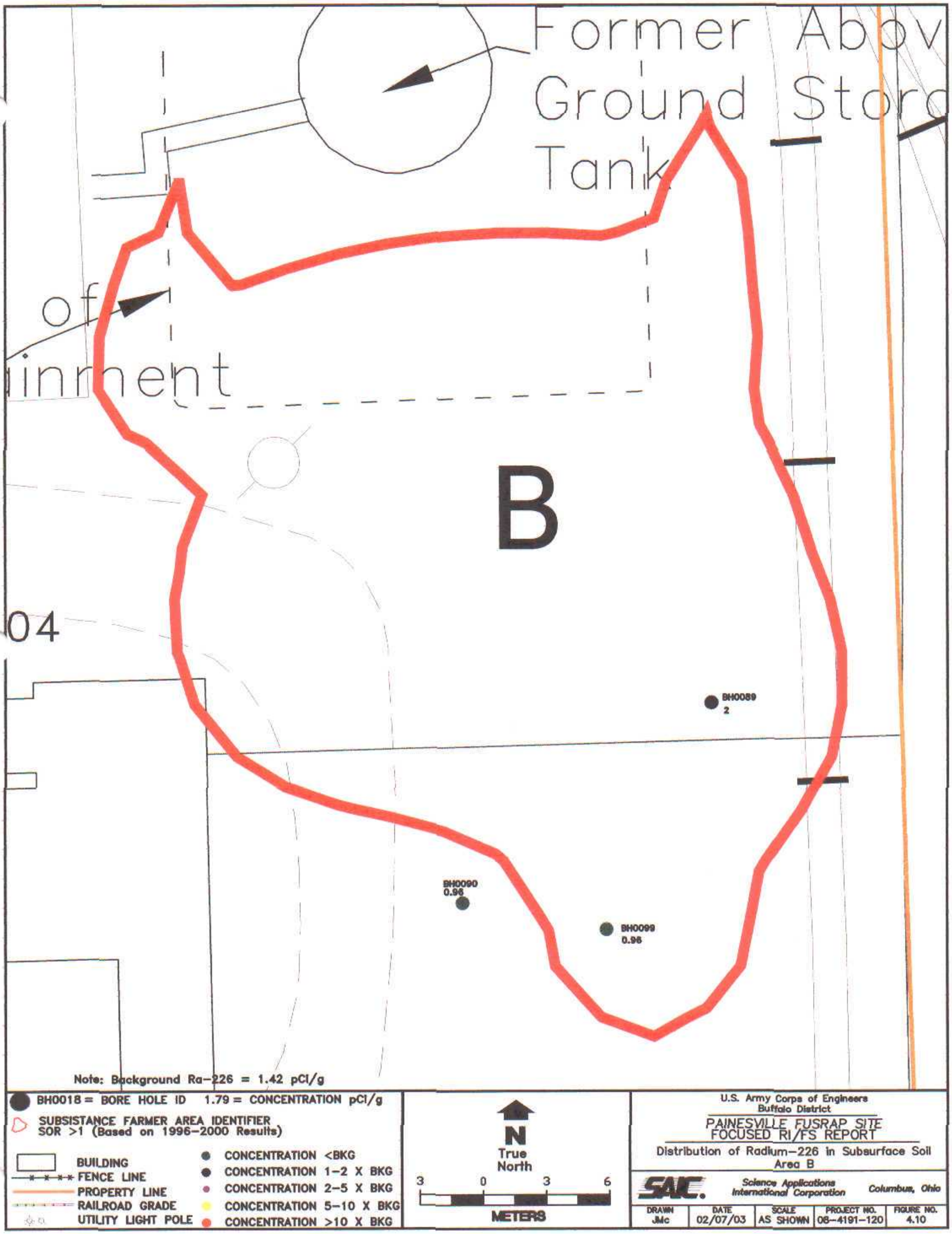
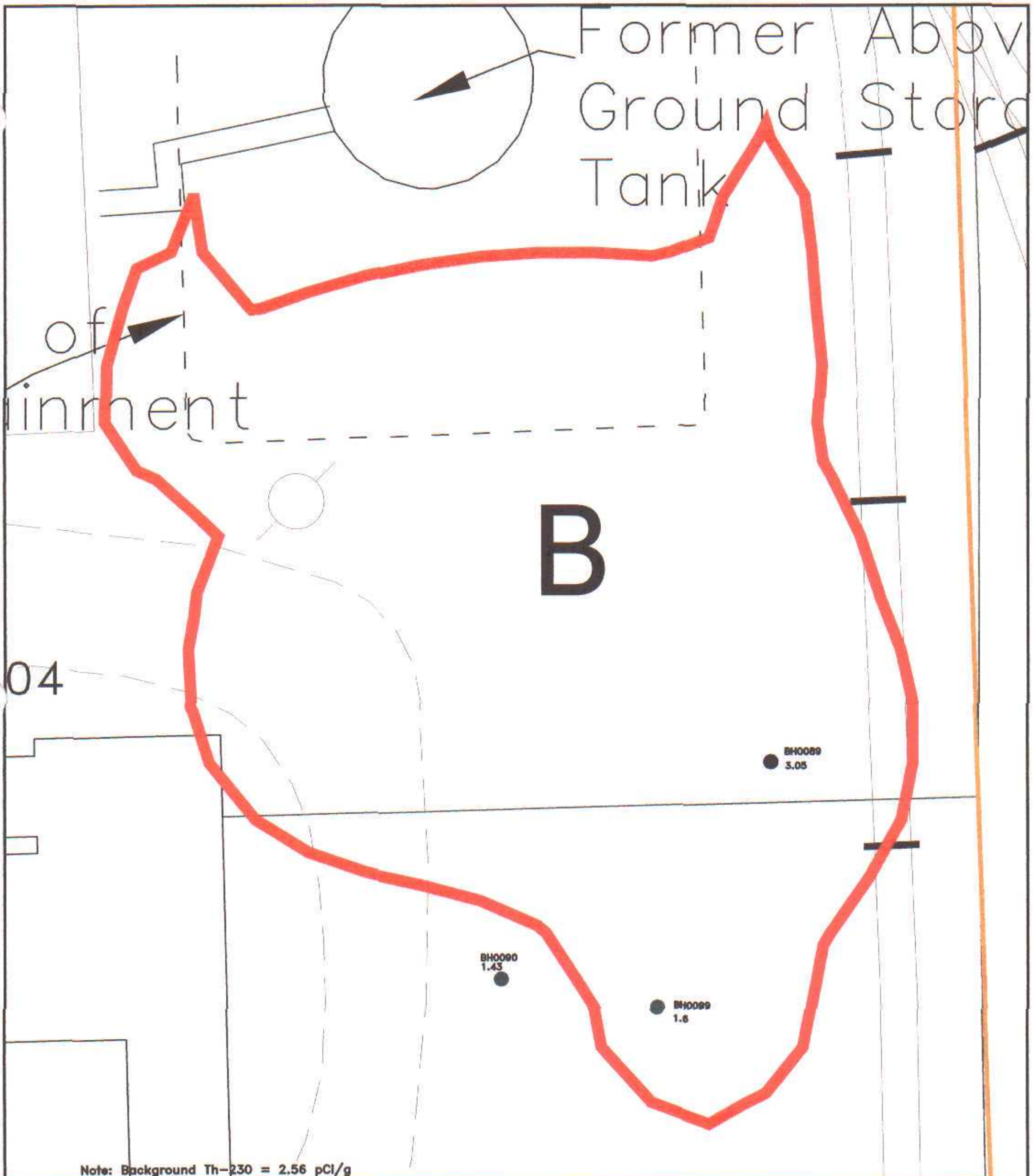


FIG 4. PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.9.DWG DATE: MAY 05, 2003 TIME AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB



FI S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.10.DWG DATE: MAY 05, 2003 9:23 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB



BH0018 = BORE HOLE ID 1.79 = CONCENTRATION pCi/g

SUBSISTANCE FARMER AREA IDENTIFIER
SOR >1 (Based on 1996–2000 Results)

BUILDING
FENCE LINE
PROPERTY LINE
RAILROAD GRADE
UTILITY LIGHT POLE

CONCENTRATION <BKG
CONCENTRATION 1–2 X BKG
CONCENTRATION 2–5 X BKG
CONCENTRATION 5–10 X BKG
CONCENTRATION >10 X BKG

N
True
North

3 0 3 6
METERS

U.S. Army Corps of Engineers
Buffalo District

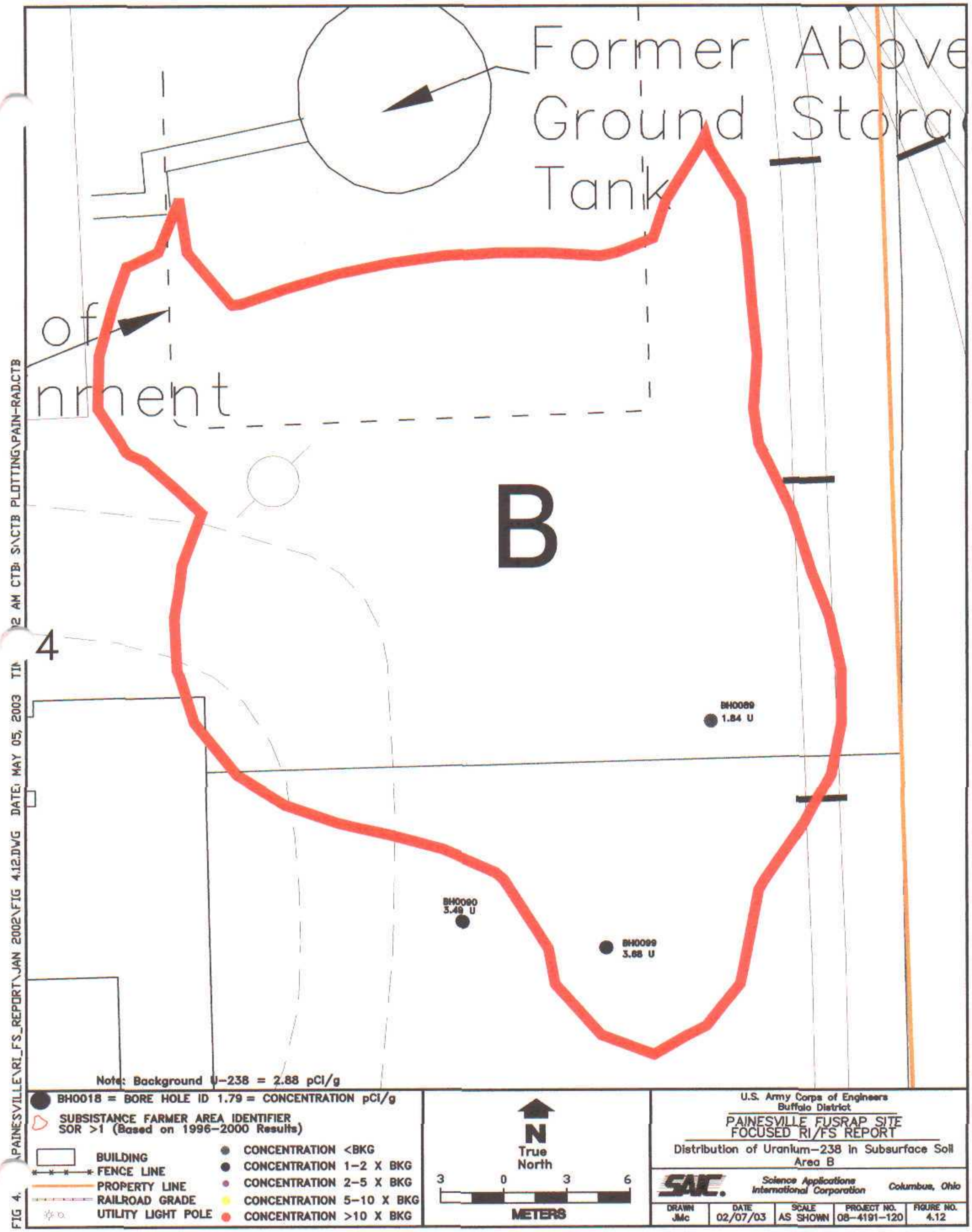
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Distribution of Thorium–230 in Subsurface Soil
Area B

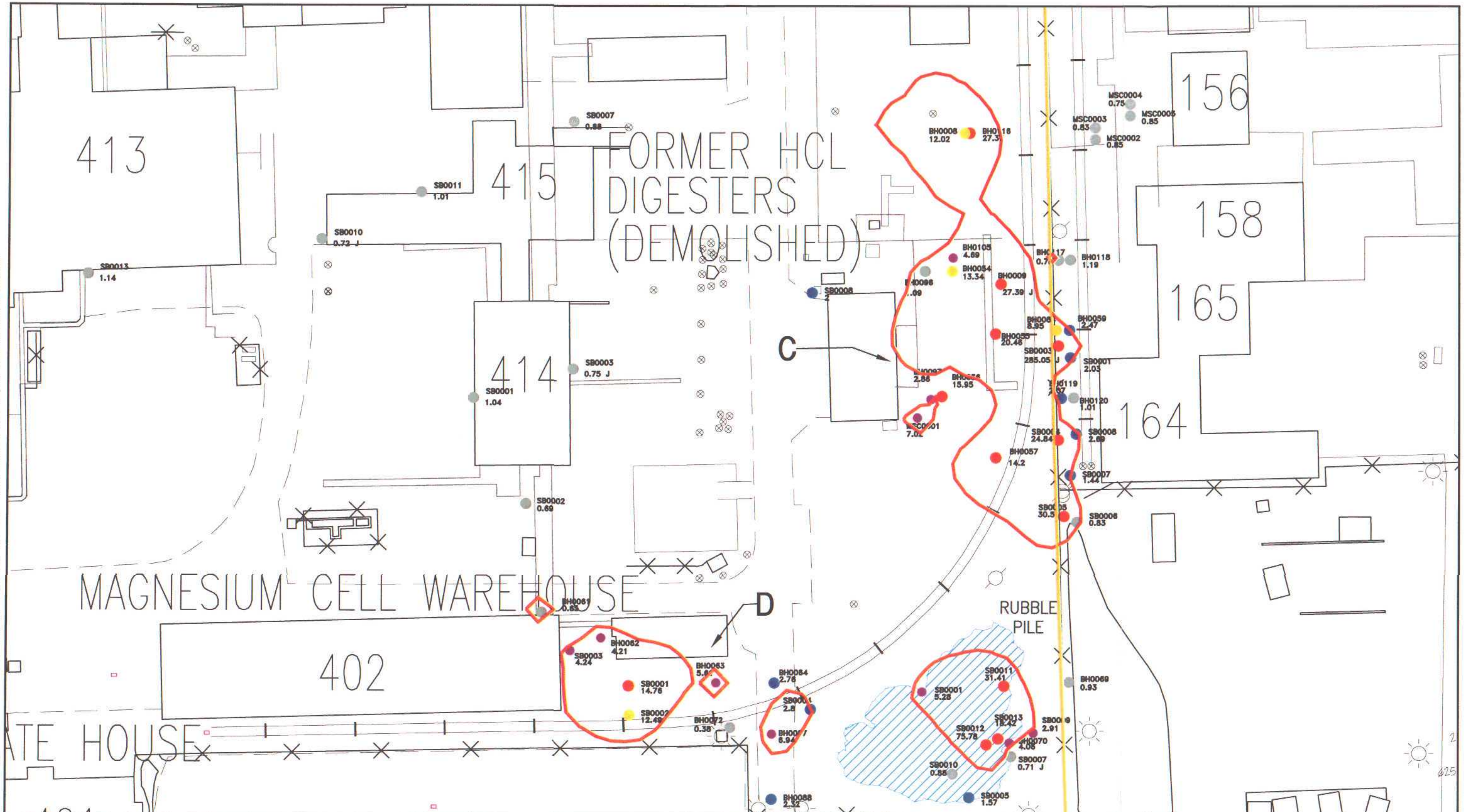
SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/07/03	AS SHOWN	08-4191-120	4.11

F:1-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.11.DWG DATE: MAY 05, 2003 ... 9:10 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB



Former Above Ground Storage Tank
B
BH0089 1.84 U
BH0090 3.49 U
BH0099 3.88 U
Note: Background U-238 = 2.88 pCi/g
BH0018 = BORE HOLE ID 1.79 = CONCENTRATION pCi/g
SUBSISTANCE FARMER AREA IDENTIFIER SOR >1 (Based on 1996–2000 Results)
BUILDING
FENCE LINE
PROPERTY LINE
RAILROAD GRADE
UTILITY LIGHT POLE
CONCENTRATION <BKG
CONCENTRATION 1–2 X BKG
CONCENTRATION 2–5 X BKG
CONCENTRATION 5–10 X BKG
CONCENTRATION >10 X BKG
N
True North
3 0 3 6
METERS
U.S. Army Corps of Engineers
Buffalo District
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT
Distribution of Uranium–238 in Subsurface Soil
Area B
SAIC.
Science Applications International Corporation
Columbus, Ohio
DRAWN JMc
DATE 02/07/03
SCALE AS SHOWN
PROJECT NO. 08–4191–120
FIGURE NO. 4.12



PROPERTY LINE	BUILDING
FENCE LINE	CONCENTRATION <BKG
TREELINE	CONCENTRATION 1-2 X BKG
RAILROAD GRADE	CONCENTRATION 2-5 X BKG
UTILITY LIGHT POLE	CONCENTRATION 5-10 X BKG
	CONCENTRATION >10 X BKG

BH0018 = BORE HOLE ID 1.79 = CONCENTRATION pCi/g

SUBSISTENCE FARMER AREA IDENTIFIER SOR >1 (Based on 1996–2000 Results)

Note: Background Ra-226 = 1.42 pCi/g

N True North

8 0 8 16

METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Distribution of Radium-226 in Surface Soil
Areas C, D, and Rubble Pile

SAIC Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/07/03	AS SHOWN	06-4191-120	4.13

FIG 4.13-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.13.DWG DATE: MAY 05, 2003 TIME: 8:49 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

FIG 4.14-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.14.DWG DATE: MAY 05, 2003 TIME: 8:37 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

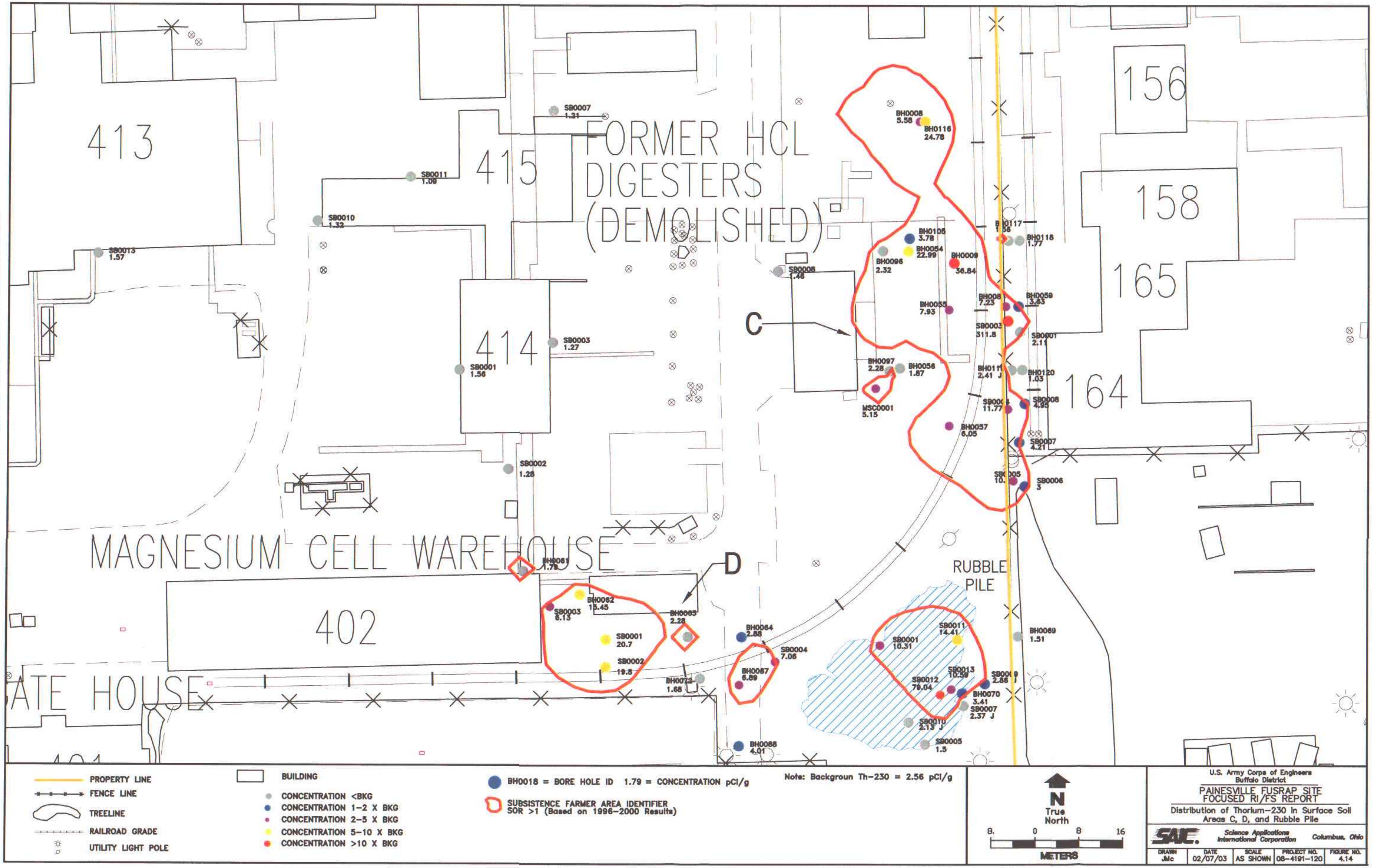
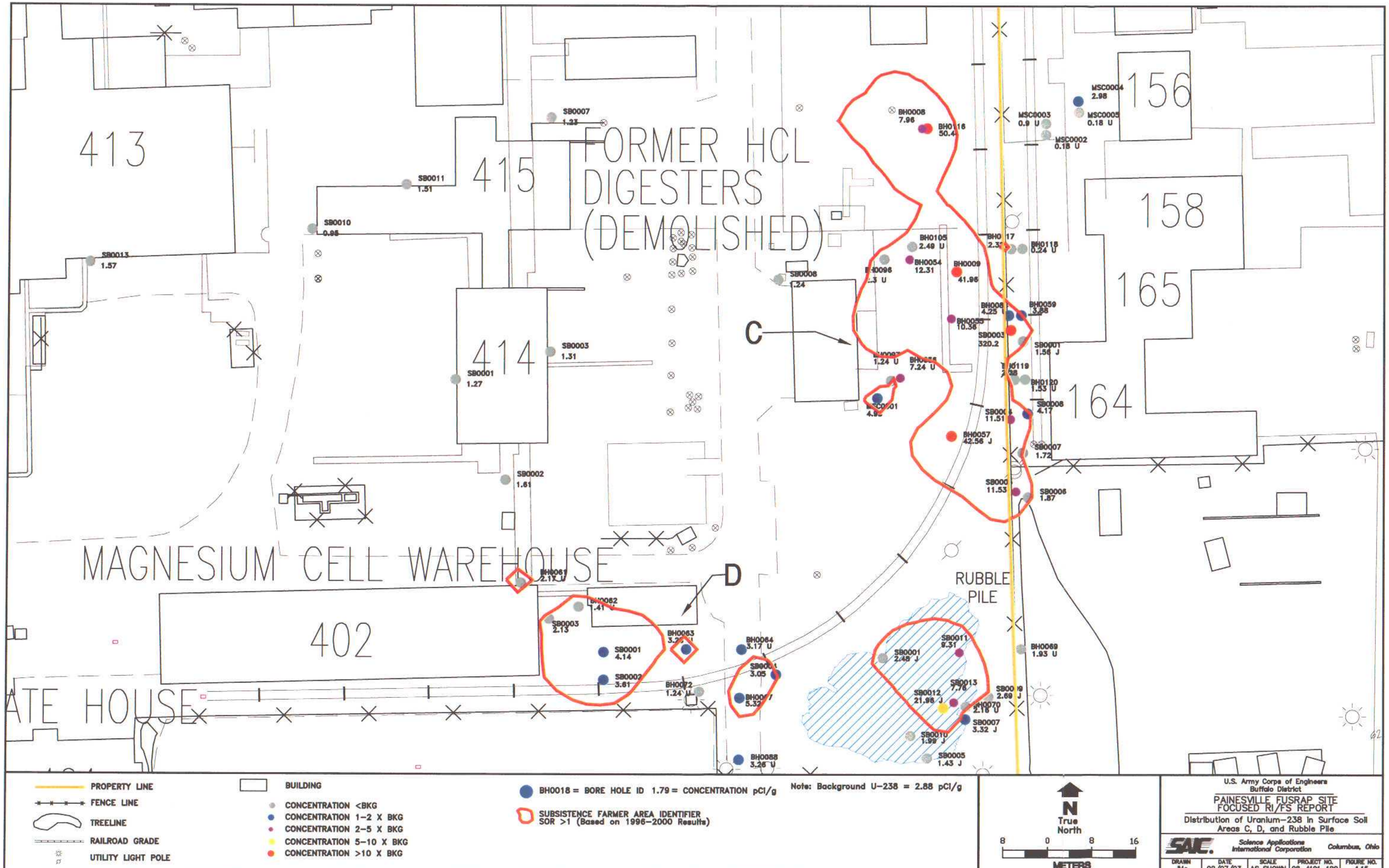
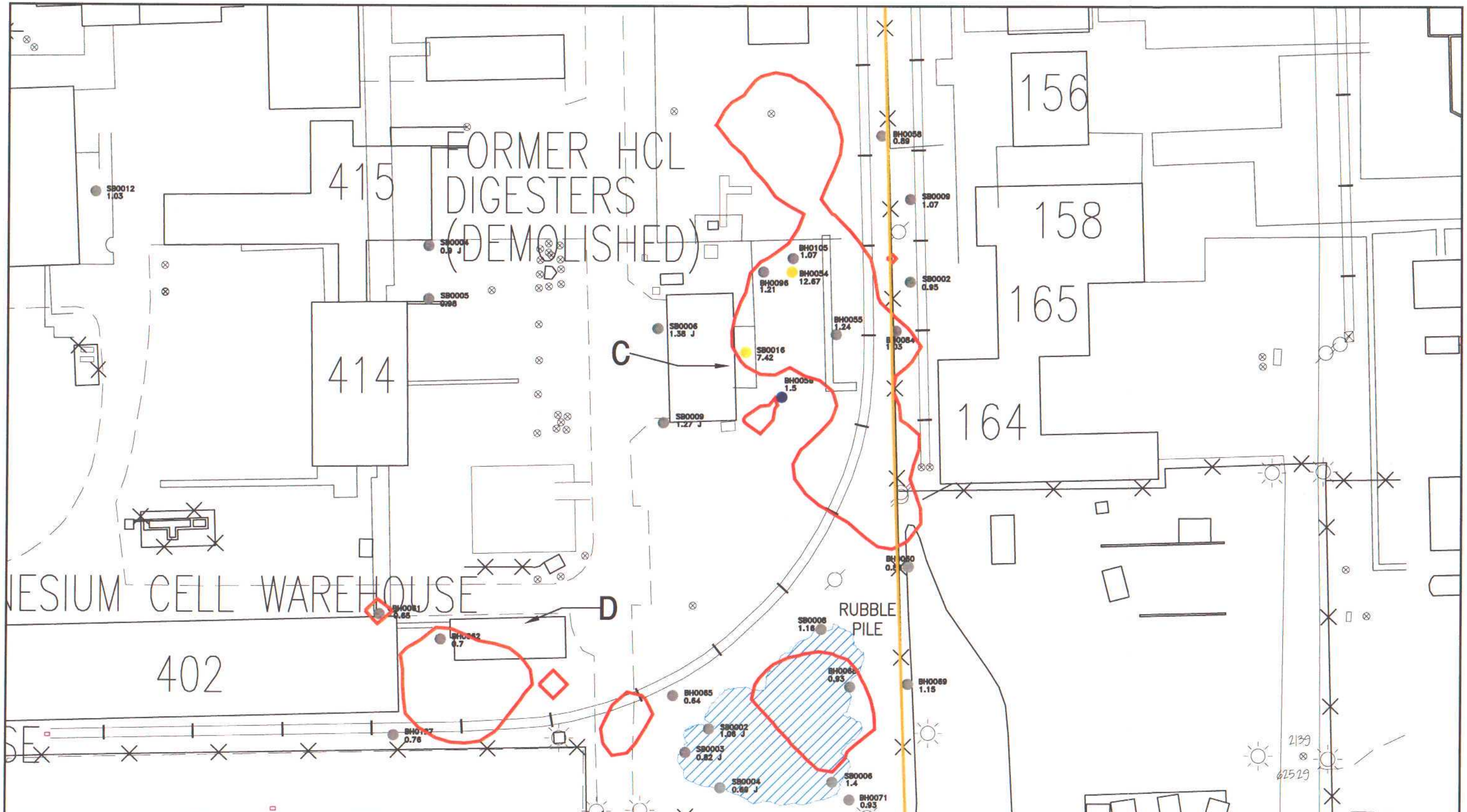


FIG 4.15-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.15.DWG DATE: MAY 05, 2003 TIME: 9:35 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB





PROPERTY LINE	BUILDING		
FENCE LINE	CONCENTRATION <BKG		
TREELINE	CONCENTRATION 1-2 X BKG		
RAILROAD GRADE	CONCENTRATION 2-5 X BKG		
UTILITY LIGHT POLE	CONCENTRATION 5-10 X BKG		
	CONCENTRATION >10 X BKG		

BH0018 = BORE HOLE ID 1.79 = CONCENTRATION pCi/g

SUBSISTENCE FARMER AREA IDENTIFIER SOR >1 (Based on 1996-2000 Results)

Note: Background Ra-226 = 1.42 pCi/g

N True North

8 0 8 16

METERS

U.S. Army Corps of Engineers
Buffalo District

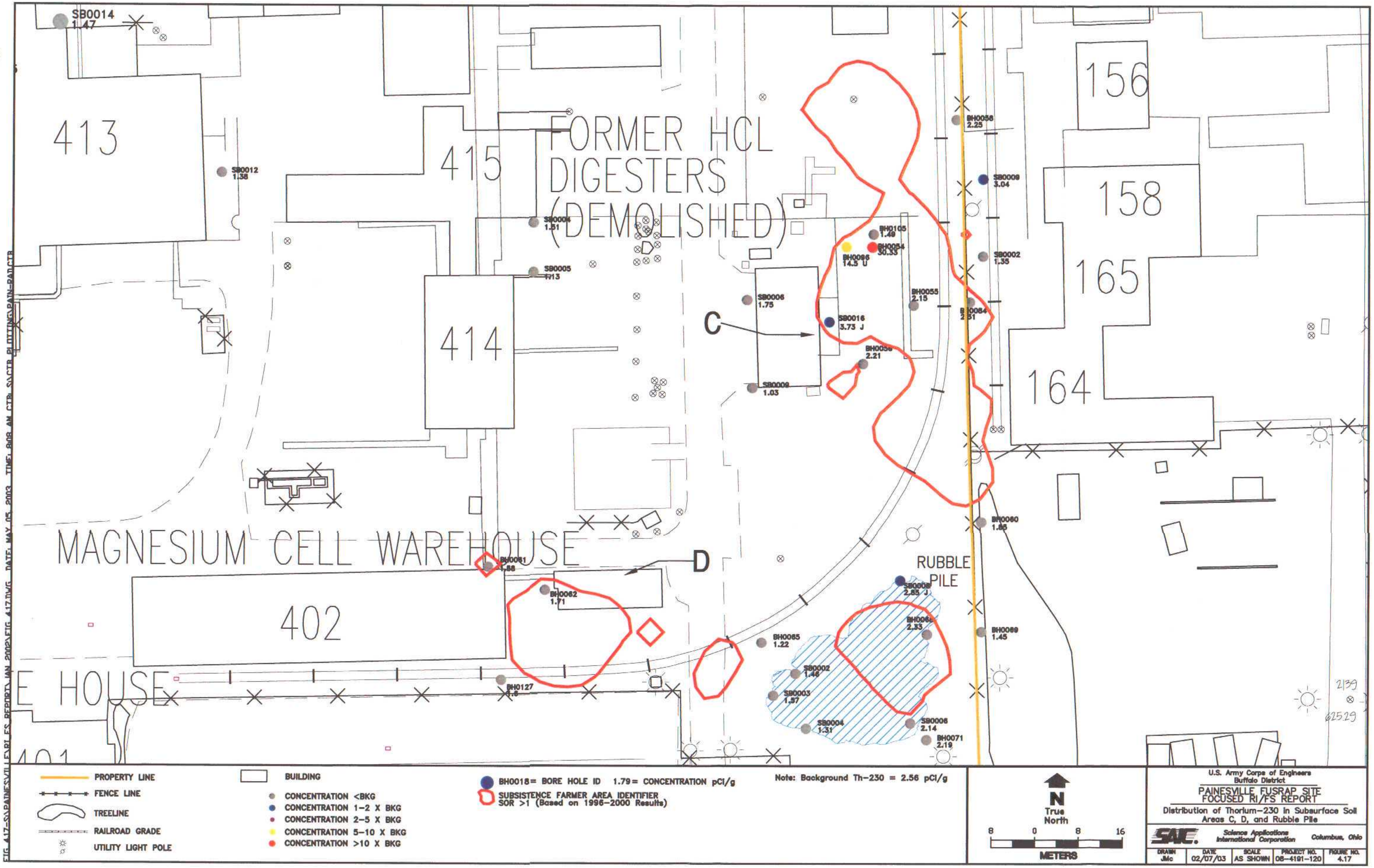
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Distribution of Radium-226 in Subsurface Soil
Areas C, D, and Rubble Pile

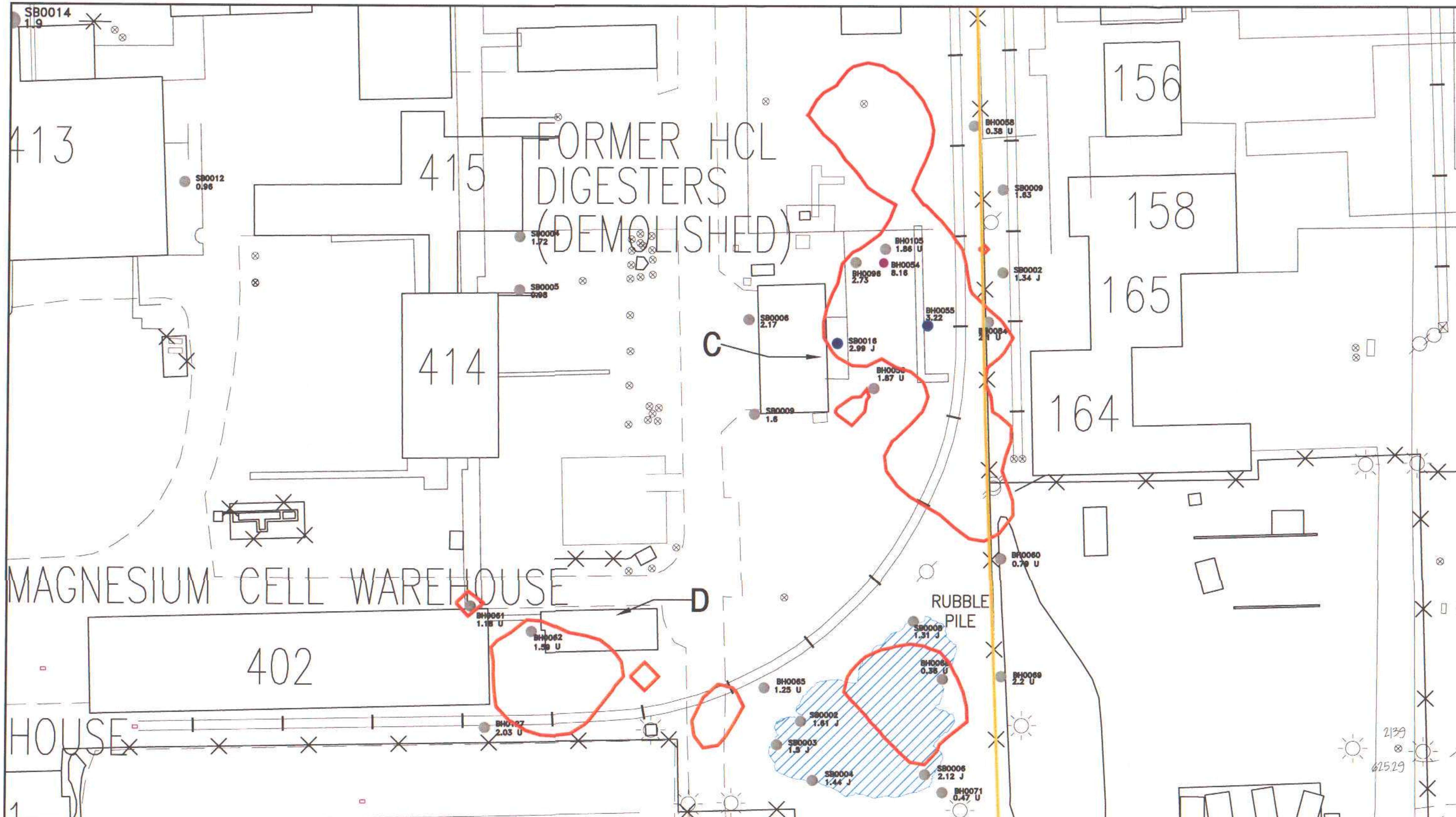
SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/07/03	AS SHOWN	06-4191-120	4.16

FIG 4.16-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.16.DWG DATE: MAY 05, 2003 TIME: 8:14 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB



SB0014
1.47
413
415
FORMER HCL
DIGESTERS
(DEMOLISHED)
156
158
165
164
414
402
MAGNESIUM CELL WAREHOUSE
E HOUSE
RUBBLE
PILE
C
D
SB0012
1.38
SB0004
1.51
SB0005
1.13
SB0006
1.75
SB0009
1.03
SB0016
3.73 J
BH0105
1.49
BH0054
30.35
BH0056
14.5 U
BH0055
2.15
BH0053
2.21
BH0064
2.51
BH0058
2.25
SB0009
3.04
SB0002
1.35
BH0060
1.85
BH0061
1.58
BH0062
1.71
BH0065
1.22
BH0127
SB0008
2.85 J
BH0068
2.33
BH0069
1.45
SB0002
1.46
SB0003
1.37
SB0004
1.31
SB0006
2.14
BH0071
2.19
2139
62529
PROPERTY LINE
FENCE LINE
TREELINE
RAILROAD GRADE
UTILITY LIGHT POLE
BUILDING
CONCENTRATION <BKG
CONCENTRATION 1-2 X BKG
CONCENTRATION 2-5 X BKG
CONCENTRATION 5-10 X BKG
CONCENTRATION >10 X BKG
BH0018= BORE HOLE ID 1.79= CONCENTRATION pCi/g
SUBSISTENCE FARMER AREA IDENTIFIER
SOR >1 (Based on 1996-2000 Results)
Note: Background Th-230 = 2.56 pCi/g
N
True
North
8 0 8 16
METERS
U.S. Army Corps of Engineers
Buffalo District
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT
Distribution of Thorium-230 in Subsurface Soil
Areas C, D, and Rubble Pile
SAIC
Science Applications International Corporation
Columbus, Ohio
DRAWN JMc
DATE 02/07/03
SCALE AS SHOWN
PROJECT NO. 06-4191-120
FIGURE NO. 4.17



PROPERTY LINE
FENCE LINE
TREELINE
RAILROAD GRADE
UTILITY LIGHT POLE

BUILDING
CONCENTRATION <BKG
CONCENTRATION 1-2 X BKG
CONCENTRATION 2-5 X BKG
CONCENTRATION 5-10 X BKG
CONCENTRATION >10 X BKG

BH0018 = BORE HOLE ID 1.79 = CONCENTRATION pCi/g

SUBSISTENCE FARMER AREA IDENTIFIER
SOR >1 (Based on 1996-2000 Results)

Note: Background U-238 = 2.88 pCi/g

N
True
North

8 0 8 16
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Distribution of Uranium-238 in Subsurface Soil
Areas C, D, and Rubble Pile

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/10/03	AS SHOWN	08-4191-120	4.18

FIG 4.18-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 4.18.DWG DATE: MAY 05, 2003 TIME: 8:06 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

RI Tables

Table 2.1 Summary of 1996 Sampling Results

IA A. Soil

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background	Background Exceed	Units
Radiological Parameters									
Actinium-227	9/119	0.31	IAA-BH0043(96)	5.08	IAA-BH0039(96)	1.56	0.61	3/9	pCi/g
Actinium-228	6/6	0.83	IAA-BH0017(96)	1.4	IAA-BH0132(96)	1.16	0	--	pCi/g
Bismuth-214	8/8	0.77	IAA-BH0017(96)	49.4	IAA-BH0043(96)	7.31	0	--	pCi/g
Cadmium-109	1/3	41.09	IAA-BH0043(96)	41.09	IAA-BH0043(96)	41.09	0	--	pCi/g
Cesium-137	22/111	0.05	IAA-BH0043(96)	0.44	IAA-BH0019(96)	0.16	0.47	0/22	pCi/g
Lead-210	1/5	44	IAA-BH0043(96)	44	IAA-BH0043(96)	44	1.42	1/1	pCi/g
Lead-212	9/9	0.28 J	IAA-BH0017(96)	2 J	IAA-BH0132(96)	1.12	0	--	pCi/g
Lead-214	8/8	0.77	IAA-BH0017(96)	49.4	IAA-BH0043(96)	7.31	0	--	pCi/g
Neodymium-147	3/3	0.35	IAA-BH0126(96)	2.7	IAA-BH0010(96)	1.72	0	--	pCi/g
Potassium-40	119/119	4.66	IAA-BH0044(96)	30.21	IAA-BH0016(96)	20.76	27.6	10/119	pCi/g
Protactinium-231	2/118	1.06	IAA-BH0038(96)	1.2	IAA-BH0044(96)	1.13	1.82	0/2	pCi/g
Radium-224	9/9	0.48	IAA-BH0017(96)	2 J	IAA-BH0132(96)	1.11	0	--	pCi/g
Radium-226	119/119	0.67	IAA-BH0044(96)	66.27	IAA-BH0039(96)	3.11	1.42	39/119	pCi/g
Radium-228	115/119	0.13	IAA-BH0044(96)	1.47	IAA-BH0104(96)	1.09	1.41	3/115	pCi/g
Thorium-227	13/23	0.15	IAA-BH0019(96)	3.65	IAA-BH0010(96)	0.74	0.81	2/13	pCi/g
Thorium-228	117/119	0.13	IAA-BH0044(96)	2.93	IAA-BH0043(96)	1.32	1.53	26/117	pCi/g
Thorium-230	100/119	0.65	IAA-BH0029(96)	49	IAA-BH0043(96)	2.67	2.56	17/100	pCi/g
Thorium-232	117/119	0.13	IAA-BH0044(96)	1.77	IAA-BH0104(96)	1.17	1.53	8/117	pCi/g
Thorium-234	2/3	15	IAA-BH0043(96)	15.3	IAA-BH0010(96)	15.15	0	--	pCi/g
Uranium-234	9/9	0.87	IAA-BH0014(96)	62.46 J	IAA-BH0043(96)	9.59	2.88	2/9	pCi/g
Uranium-235	93/119	0.11 J	IAA-BH0017(96)	6.4	IAA-BH0039(96)	0.46	0.21	49/93	pCi/g
Uranium-238	44/119	0.65	IAA-BH0041(96)	63.69 J	IAA-BH0043(96)	6.76	2.88	13/44	pCi/g

Table 2.1 Summary of 1996 Sampling Results (continued)

IA B. Soil Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background	Background Exceed	Units
Radiological Parameters									
Actinium-227	4/14	0.45	IAB-BH0099(96)	1.3	IAB-BH0089(96)	0.75	0.61	2/4	pCi/g
Actinium-228	1/1	0.64	IAB-BH0091(96)	0.64	IAB-BH0091(96)	0.64	0	--	pCi/g
Bismuth-214	1/1	2.3	IAB-BH0091(96)	2.3	IAB-BH0091(96)	2.3	0	--	pCi/g
Cesium-137	6/13	0.08	IAB-BH0089(96)	0.56	IAB-BH0089(96)	0.32	0.47	1/6	pCi/g
Lead-210	1/1	1.8 J	IAB-BH0091(96)	1.8 J	IAB-BH0091(96)	1.8	1.42	1/1	pCi/g
Lead-212	1/1	0.63 J	IAB-BH0091(96)	0.63 J	IAB-BH0091(96)	0.63	0	--	pCi/g
Lead-214	1/1	2.3	IAB-BH0091(96)	2.3	IAB-BH0091(96)	2.3	0	--	pCi/g
Neodymium-147	1/1	0.38	IAB-BH0091(96)	0.38	IAB-BH0091(96)	0.38	0	--	pCi/g
Potassium-40	14/14	3.4	IAB-BH0091(96)	18.62	IAB-BH0090(96)	12.16	27.6	0/14	pCi/g
Radium-224	1/1	0.61	IAB-BH0091(96)	0.61	IAB-BH0091(96)	0.61	0	--	pCi/g
Radium-226	14/14	0.82	IAB-BH0099(96)	10.64	IAB-BH0089(96)	2.99	1.42	8/14	pCi/g
Radium-228	14/14	0.51	IAB-BH0089(96)	1.3	IAB-BH0090(96)	0.91	1.41	0/14	pCi/g
Thorium-228	14/14	0.51	IAB-BH0089(96)	1.37	IAB-BH0089(96)	1.03	1.53	0/14	pCi/g
Thorium-230	11/14	1.16	IAB-BH0099(96)	6.38	IAB-BH0091(96)	2.87	2.56	6/11	pCi/g
Thorium-232	14/14	0.51	IAB-BH0089(96)	1.33	IAB-BH0090(96)	0.95	1.53	0/14	pCi/g
Thorium-234	1/1	1.4	IAB-BH0091(96)	1.4	IAB-BH0091(96)	1.4	0	--	pCi/g
Uranium-235	12/14	0.13	IAB-BH0099(96)	1.62	IAB-BH0089(96)	0.51	0.21	7/12	pCi/g

Table 2.1 Summary of 1996 Sampling Results (continued)

IA C. Soil

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background	Background Exceed	Units
Radiological Parameters									
Actinium-227	18/44	0.32	IAC-BH0097(96)	2.13	IAC-BH0057(96)	1.01	0.61	11/18	pCi/g
Actinium-228	3/3	0.58 J	IAC-BH0057(96)	1.1 J	IAC-BH0009(96)	0.86	0	--	pCi/g
Bismuth-214	6/6	0.81	IAC-BH0117(96)	71.1	IAC-BH0116(96)	21.29	0	--	pCi/g
Cadmium-109	4/5	9.5	IAC-BH0057(96)	66.1	IAC-BH0116(96)	25.45	0	--	pCi/g
Cesium-137	15/38	0.06	IAC-BH0008(96)	0.68	IAC-BH0084(96)	0.2	0.47	2/15	pCi/g
Europium-155	2/2	1.1 J	IAC-BH0057(96)	1.8	IAC-BH0009(96)	1.45	0	--	pCi/g
Lead-210	4/5	9.6	IAC-BH0057(96)	54.8	IAC-BH0116(96)	24.4	1.42	4/4	pCi/g
Lead-212	4/5	0.36	IAC-BH0117(96)	0.67	IAC-BH0009(96)	0.53	0	--	pCi/g
Lead-214	6/6	0.81	IAC-BH0117(96)	71.1	IAC-BH01 t6(96)	21.29	0	--	pCi/g
Neodymium-147	2/5	1.9 J	IAC-BH0009(96)	2.8 J	IAC-BH0116(96)	2.35	0	--	pCi/g
Niobium-95	2/3	1.3	IAC-BH0009(96)	2.8	IAC-BH0116(96)	2.05	0	--	pCi/g
Potassium-40	44/44	2.46	IAC-BH0057(96)	25.22	IAC-BH0105(96)	12.2	27.6	0/44	pCi/g
Protactinium-231	2/44	1.86	IAC-BH0084(96)	2.17	IAC-BH0057(96)	2.02	1.82	2/2	pCi/g
Radium-224	4/4	0.35 J	IAC-BH0117(96)	0.73	IAC-BH0055(96)	0.58	0	--	pCi/g
Radium-226	48/48	0.61	IAC-BH0056(96)	27.39 J	IAC-BH0009(96)	6.67	1.42	26/48	pCi/g
Radium-228	40/44	0.2	IAC-BH0096(96)	1.3	IAC-BH0105(96)	0.8	1.41	0/40	pCi/g
Thorium-227	4/6	1.36	IAC-BH0055(96)	4.53	IAC-BH0009(96)	2.73	0.81	4/4	pCi/g
Thorium-228	41/44	0.27	IAC-BH0120(96)	83.27 J	IAC-BH0009(96)	4.13	1.53	9/41	pCi/g
Thorium-230	35/44	1.03	IAC-BH0120(96)	36.84	IAC-BH0009(96)	6.82	2.56	16/35	pCi/g
Thorium-232	47/48	0.27	IAC-BH0096(96)	1.96	IAC-BH0009(96)	0.94	1.53	4/47	pCi/g
Thorium-234	3/5	4.4	IAC-BH0057(96)	15.3	IAC-BH0116(96)	9	0	--	pCi/g
Uranium-234	6/6	1.96	IAC-BH0117(96)	49.24	IAC-BH0116(96)	24.57	2.88	4/6	pCi/g
Uranium-235	43/44	0.08	IAC-BH0056(96)	3.11	IAC-BH0116(96)	0.89	0.21	27/43	pCi/g
Uranium-238	20/48	2.28	IAC-BH0119(96)	50.44	IAC-BH0116(96)	12.18	2.88	17/20	pCi/g

Table 2.1 Summary of 1996 Sampling Results (continued)

IA D. Soil

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background	Background Exceed	Units
Radiological Parameters									
Actinium-227	4/16	0.33	IAD-BH0063(96)	0.56	IAD-BH0067(96)	0.45	0.61	0/4	pCi/g
Cesium-137	8/16	0.05	IAD-BH0061(96)	0.73	IAD-BH0062(96)	0.22	0.47	1/8	pCi/g
Potassium-40	16/16	4.62	IAD-BH0064(96)	16.81	IAD-BH0127(96)	9.83	27.6	0/16	pCi/g
Radium-226	16/16	0.38	IAD-BH0072(96)	6.94	IAD-BH0067(96)	2.31	1.42	7/16	pCi/g
Radium-228	16/16	0.3	IAD-BH0061(96)	1.06	IAD-BH0127(96)	0.68	1.41	0/16	pCi/g
Thorium-228	16/16	0.48	IAD-BH0072(96)	1.68	IAD-BH0088(96)	0.96	1.53	1/16	pCi/g
Thorium-230	12/16	1.58	IAD-BH0061(96)	15.45	IAD-BH0062(96)	4.02	2.56	6/12	pCi/g
Thorium-232	16/16	0.36	IAD-BH0064(96)	1.28	IAD-BH0062(96)	0.86	1.53	0/16	pCi/g
Uranium-235	15/16	0.09	IAD-BH0061(96)	0.83	IAD-BH0067(96)	0.34	0.21	8/15	pCi/g
Uranium-238	3/16	2.37	IAD-BH0088(96)	5.32	IAD-BH0067(96)	3.54	2.88	2/3	pCi/g

IA G. Soil

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background	Background Exceed	Units
Radiological Parameters									
Actinium-227	3/15	0.23	IAG-BH0021(96)	1.98	IAG-BH0023(96)	0.93	0.61	1/3	pCi/g
Actinium-228	1/1	0.77	IAG-BH0024(96)	0.77	IAG-BH0024(96)	0.77	0	--	pCi/g
Bismuth-214	1/1	2.2	IAG-BH0024(96)	2.2	IAG-BH0024(96)	2.2	0	--	pCi/g
Cesium-137	5/14	0.05	IAG-BH0021(96)	0.37	IAG-BH0023(96)	0.22	0.47	0/5	pCi/g
Lead-210	1/1	1.2	IAG-BH0024(96)	1.2	IAG-BH0024(96)	1.2	1.42	0/1	pCi/g
Lead-212	1/1	0.6	IAG-BH0024(96)	0.6	IAG-BH0024(96)	0.6	0	--	pCi/g
Lead-214	1/1	2.2	IAG-BH0024(96)	2.2	IAG-BH0024(96)	2.2	0	--	pCi/g
Neodymium-147	1/1	0.73	IAG-BH0024(96)	0.73	IAG-BH0024(96)	0.73	0	--	pCi/g
Potassium-40	15/15	2.98	IAG-BH0021(96)	24.15	IAG-BH0023(96)	13.49	27.6	0/15	pCi/g
Radium-224	1/1	0.59	IAG-BH0024(96)	0.59	IAG-BH0024(96)	0.59	0	--	pCi/g
Radium-226	15/15	0.49	IAG-BH0021(96)	22.4	IAG-BH0023(96)	3.19	1.42	6/15	pCi/g
Radium-228	15/15	0.47	IAG-BH0021(96)	1.27	IAG-BH0023(96)	0.97	1.41	0/15	pCi/g
Thorium-227	1/1	0.19	IAG-BH0024(96)	0.19	IAG-BH0024(96)	0.19	0.81	0/1	pCi/g
Thorium-228	15/15	0.57	IAG-BH0023(96)	1.47	IAG-BH0023(96)	1.06	1.53	0/15	pCi/g
Thorium-230	14/15	0.97	IAG-BH0023(96)	5.95	IAG-BH0023(96)	2.34	2.56	5/14	pCi/g
Thorium-232	15/15	0.39	IAG-BH0021(96)	1.75	IAG-BH0026(96)	0.99	1.53	2/15	pCi/g
Uranium-234	1/1	2.67 J	IAG-BH0024(96)	2.67 J	IAG-BH0024(96)	2.67	2.88	0/1	pCi/g
Uranium-235	10/15	0.15	IAG-BH0027(96)	2.21	IAG-BH0023(96)	0.52	0.21	5/10	pCi/g
Uranium-238	5/15	2	IAG-BH0022(96)	12.12	IAG-BH0023(96)	6.22	2.88	3/5	pCi/g

Table 2.1 Summary of 1996 Sampling Results (continued)

IA I. Soil

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background	Background Exceed	Units
Radiological Parameters									
Actinium-227	3/14	0.28	IAI-BH0047(96)	2.91	IAI-BH0047(96)	1.31	0.61	2/3	pCi/g
Actinium-228	1/1	1.1	IAI-BH0002(96)	1.1	IAI-BH0002(96)	1.1	0	--	pCi/g
Americium-241	1/14	0.47	IAI-BH0047(96)	0.47	IAI-BH0047(96)	0.47	0.25	1/1	pCi/g
Bismuth-214	1/1	125.11	IAI-BH0047(96)	125.11	IAI-BH0047(96)	125.11	0	--	pCi/g
Cadmium-109	1/3	100.7 J	IAI-BH0047(96)	100.7 J	IAI-BH0047(96)	100.7	0	--	pCi/g
Cesium-137	4/11	0.06	IAI-BH0047(96)	0.25	IAI-BH0046(96)	0.13	0.47	0/4	pCi/g
Europium-155	1/2	7.1 J	IAI-BH0001(96)	7.1 J	IAI-BH0001(96)	7.1	0	--	pCi/g
Lead-210	2/3	74 J	IAI-BH0001(96)	76.86 J	IAI-BH0047(96)	75.43	1.42	2/2	pCi/g
Lead-214	1/1	125.11	IAI-BH0047(96)	125.11	IAI-BH0047(96)	125.11	0	--	pCi/g
Neodymium-147	2/3	3.5 J	IAI-BH0001(96)	6.19 J	IAI-BH0047(96)	4.85	0	--	pCi/g
Niobium-95	1/1	11.19 J	IAI-BH0047(96)	11.19 J	IAI-BH0047(96)	11.19	0	--	pCi/g
Niobium-95m	1/1	7.3 J	IAI-BH0001(96)	7.3 J	IAI-BH0001(96)	7.3	0	--	pCi/g
Potassium-40	14/14	4.82	IAI-BH0047(96)	25.32	IAI-BH0048(96)	15.01	27.6	0/14	pCi/g
Radium-224	1/1	0.98	IAI-BH0002(96)	0.98	IAI-BH0002(96)	0.98	0	--	pCi/g
Radium-226	14/14	0.35	IAI-BH0002(96)	125.11	IAI-BH0047(96)	15.94	1.42	9/14	pCi/g
Radium-228	12/14	0.43	IAI-BH0047(96)	1.18	IAI-BH0048(96)	0.94	1.41	0/12	pCi/g
Thorium-227	3/3	0.95 J	IAI-BH0002(96)	6.99	IAI-BH0047(96)	4.66	0.81	3/3	pCi/g
Thorium-228	14/14	0.43	IAI-BH0047(96)	2.18	IAI-BH0047(96)	1.32	1.53	5/14	pCi/g
Thorium-230	11/14	1.46	IAI-BH0002(96)	304.2 J	IAI-BH0001(96)	33.26	2.56	5/11	pCi/g
Thorium-232	14/14	0.43	IAI-BH0047(96)	2.11 J	IAI-BH0001(96)	1.2	1.53	3/14	pCi/g
Thorium-234	2/3	22.2	IAI-BH0001(96)	25.38 J	IAI-BH0047(96)	23.79	0	--	pCi/g
Uranium-234	3/3	1.01	IAI-BH0002(96)	43.93	IAI-BH0047(96)	21.8	2.88	2/3	pCi/g
Uranium-235	14/14	0.11	IAI-BH0001(96)	4.73 J	IAI-BH0001(96)	1.03	0.21	9/14	pCi/g
Uranium-238	7/14	0.96	IAI-BH0002(96)	44.56	IAI-BH0047(96)	14.25	2.88	6/7	pCi/g

Table 2.1 Summary of 1996 Sampling Results (continued)

IA RP. Soil

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background	Background Exceed	Units
Radiological Parameters									
Cesium-137	1/6	0.17	IARP-BH0070(96)	0.17	IARP-BH0070(96)	0.17	0.47	0/1	pCi/g
Potassium-40	6/6	13.39	IARP-BH0065(96)	25.37	IARP-BH0069(96)	18.94	27.6	0/6	pCi/g
Radium-226	6/6	0.64	IARP-BH0065(96)	4.06	IARP-BH0070(96)	1.44	1.42	1/6	pCi/g
Radium-228	6/6	0.75	IARP-BH0065(96)	1.36	IARP-BH0069(96)	1.04	1.41	0/6	pCi/g
Thorium-228	6/6	0.92	IARP-BH0070(96)	1.7	IARP-BH0069(96)	1.28	1.53	2/6	pCi/g
Thorium-230	6/6	1.22	IARP-BH0065(96)	3.41	IARP-BH0070(96)	2.02	2.56	1/6	pCi/g
Thorium-232	6/6	0.76	IARP-BH0065(96)	1.82	IARP-BH0071(96)	1.19	1.53	1/6	pCi/g
Uranium-235	4/6	0.11	IARP-BH0065(96)	0.38	IARP-BH0070(96)	0.22	0.21	1/4	pCi/g

Table 2.1 Summary of 1996 Sampling Results (continued)

Sediment

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background	Background Exceed	Units
Radiological Parameters									
Radium-226	9/9	0.61	NA-SWSD0005(96)	2.14	NA-SWSD0006(96)	1.12	--		pCi/g
Thorium-228	11/11	0.5 J	NA-SWSD0005(96)	1.13 J	NA-SWSD0007(96)	0.8	--	--	pCi/g
Thorium-230	11/11	0.62 J	NA-SWSD0005(96)	1.92 J	NA-SWSD0002(96)	1.32	--	--	pCi/g
Thorium-232	11/11	0.21 J	NA-SWSD0005(96)	1.09 J	NA-SWSD0008(96)	0.64	--	--	pCi/g
Uranium-234	11/11	0.83	NA-SWSD0005(96)	7.4	NA-SWSD0007(96)	2.29	--	--	pCi/g
Uranium-235	4/11	0.12	NA-SWSD0004(96)	0.98 J	NA-SWSD0006(96)	0.43	--	--	pCi/g
Uranium-238	11/11	1.06	NA-SWSD0005(96)	8.11	NA-SWSD0007(96)	2.42	--	--	pCi/g

Surface Water

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background	Background Exceed	Units
Radiological Parameters									
Gross Alpha	1/3	6.14	NA-SWSD0011(96)	6.14	NA-SWSD0011(96)	6.14	--	--	pCi/l
Gross Beta	3/3	5.51	NA-SWSD0013(96)	7.12	NA-SWSD0011(96)	6.29	--	--	pCi/l
Radium-226	5/9	0.14	NA-SWSD0005(96)	0.59	NA-SWSD0007(96)	0.29	--	--	pCi/l
Thorium-228	4/10	0.51	NA-SWSD0012(96)	2.13	NA-SWSD0008(96)	1.07	--	--	pCi/l
Thorium-230	3/10	0.28	NA-SWSD0003(96)	0.64	NA-SWSD0008(96)	0.43	--	--	pCi/l
Uranium-234	5/11	0.29	NA-SWSD0009(96)	2.45	NA-SWSD0011(96)	1.6	--	--	pCi/l
Uranium-235	2/11	0.23	NA-SWSD0002(96)	0.24	NA-SWSD0007(96)	0.24	--	--	pCi/l
Uranium-238	5/11	0.21	NA-SWSD0009(96)	1.62	NA-SWSD0011(96)	1.13	--	--	pCi/l

Table 3.1: Summary of Field Change Request

Painesville FUSRAP Site Focused RI/FS Report

CR No.	Date Initiated	SAP Sect. Affected	Baseline Identification	Justification
001	09/05/00	3.0	Instead of backfilling geoprobe holes w/Grout, will be using bentonite chips/hydrated. Procedure is to pour chips down hole to fill approximately 2 feet intervals, ramrod, and hydrate; repeat to ground surface.	Geoprobe holes will be able to be backfilled immediately after removal of downhole tools, thus reducing risk of open hole collaspe/subsidence causing a bridge of native material.
002	09/06/00	3.2.1	Clarification to 4th paragraph, sec 3.2.1: For determining from which interval of soil column to collect sample if location reveals at or less than background gamma activity. When Gamma count reveals statistically identical readings, or less, of background, then the uppermost interval in the soil column (less the grass-root zone) will be collected for lab analysis.	The upper-most intervals are most likely fill material and, therefore, have the highest probability of containing MED/AEC material-type contamination.
003	09/06/00	3.1.2	Instead of collecting two discrete soil samples from each of the Rubble Pile locations (0"-6" and 5'-6') the procedure for the collection determination will follow the soil sampling protocol set forth in Sec. 3.2.1.	This change brings sampling procedure into consistancy with other areas being sampled, i.e: selecting samples based on gamma detection.
004	09/13/00	3.1.2	Instead of collecting the four (4) sample locations marked "M" and located on the SAP map in the northern most section of Area A, the "M" location on the BDE Tank Berm will be replaced with another of the remaining five (5) MARSSIM locations (pre-established grid) where the rig will be able to access.	The berm embankment is too steep for the dill rig to access this location. Moving this MARSSIM point to another accessible MARSSIM point maintains the MARSSIM approach being established.
005	09/13/00	3.1.2	Along the West Lonza Fence elevated levels of Gamma was detected (adjacent to Area C). Determine to grab bias samples at points along fence with the highest gamma activity.	HPs notice slag material in proximity of elevated Gamma along fence. The analysis should indicate whether or not the gamma emitting constituents are MED/AEC related or not.
006	09/14/00	3.1.2	Since unable to drill random sample locations within the Rubble Pile, collect three (3) descrete/biased (based on Gamma Detection NaI 2x2) samples from the interior of the rubble pile. Following the DOE Map, indicating an SOR>1 on the eastern third of thepile, will concentrate locating the 3 sample locations there.	Sampling further into the rubble pile will help characterize the radiological contamination within.
007	09/18/00	3.1.2	Based on the 2000 Gamma Walkover Survey, investigate areas showing previously unknown areas of elevated Gamma activity with two goals in mind: 1) to confirm (or not) the radionuclide contamination in the soil by sample analysis and 2) to bound those areas with additional samples if those areas had not already been bounded in previous investigations.	The 2000 Gamma Walkover Survey data should be confirmed during this field effort.

Table 3.2: Radiological Instrumentation Used in the Field at Painesville FUSRAP Site

Use	Model	Type
Gross Alpha/Beta analysis of smears and air samples	Ludlum 2929 with 43-10-1 probe	Alpha/beta scaler with alpha/beta dual phosphor scintillation detector
Dose rate measurements of samples and coolers prior to shipment	Bicron MicroRem Meter	Energy compensated Geiger Mueller detector
Walkover gamma surveys and sample screening	Ludlum 2221 with 44-10 probe	Single channel analyzer with 2" x 2" gamma scintillation (NaI) detector
Personnel and equipment "direct frisk" surveys	Ludlum 2224 with 43-89 probe	Alpha/beta scaler / ratemeter with 126 cm^2 alpha/beta scintillation detector
Personnel and equipment "direct frisk" surveys	Ludlum Model 3 with 43-5 probe	General purpose survey meter with 50 cm^2 alpha scintillation detector
Walkover Gamma Survey	Ludlum 2221 with G-5 probe	Single channel analyzer with low energy gamma detector
Personnel air sampling surveys	Gillair 5	Portable air sample pump

Table 3.3 Parameters and Analytical Methods for Painesville Site Soils.

Parameters	Analytical Methods
Chemistry: Lionville Laboratory Inc.	
Volatile Organic compounds	SW-846 5035/8260B
Semivolatile Organic Compounds	SW846 3540C/8270C[a]
Metals	SW846 3050A/6010B. 6020, or 7000 series[a]
Mercury	SW846 7471A
Pesticides	SW846 3540C/8081A[a]
Polychlorinated Biphenyls (PCBs)	SW846 3540C/8082[a]
Radiochemistry: Eberline Services – Oak Ridge Laboratories.	
Radium-226	Gamma Spectroscopy (LANL ER-130 Modified)[b]
Iso-Thorium	Alpha Spectroscopy (EML Th-01 modified)
Iso-Uranium	Alpha Spectroscopy (EML U-02 modified)[b]
Geotechnical Analysis	
Grain Size	ASTM D422
Atterberg Limits	ASTM D4318
Moisture Content	ASTM D2216

ASTM- American Society for Testing and Materials
[a] Test Methods for Evaluating Soild Waste, U.S. EPA SW-846 third edition.
[b] Laboratory specific procedures which are consistent with DOE Environmental Measurements Laboratory (DML) Procedure Manual (HASL-300), will be submitted for the project files.

Table 3.4 QA/QC Sample Correlation
Painesville FUSRAP Site

Soil Boring ID	Sample ID	Duplicate ID	Split ID
IAA-SB0004	PVSB0010	PVSB9002	PVSB9501
IAA-SB0007	PVSB0019	PVSB9003	PVSB9502
IAA-SB0021	PVSB0061	PVSB9004	
IAA-SB0023	PVSB0067		PVSB9503
IAA-SB0024	PVSB0070		PVSB9504
IAA-SB0026	PVSB0076	PVSB9005	
IAA-SB0027	PVSB0079	PVSB9007	
IAA-SB0030	PVSB0088	PVSB9006	
IAA-SB0034	PVSB0100		PVSB9505
IAA-SB0036	PVSB0106		PVSB9506
IAA-SB0037	PVSB0206		PVSB9507
IAP1B-SB0004	PVSB0124	PVSB9000	
IAP1B-SB0005	PVSB0127	PVSB9001	PVSB9500

Table 3.5 Background Values for Radionuclides (95% UTL), Painesville FUSRAP Site; Focused RI/FS Report

Radionuclides	Soil (pCi/g) UTL	Minimum Detect	Maximum Detect	Average Result	Proportion of Detects
Actinium-227	0.61	0.08	0.61	0.41	15/15
Americium-241	0.25	0.05	0.25	0.15	13/15
Cesium-137	0.47	0.00	0.47	0.12	14/15
Potassium-40	27.60	12.44	27.6	17.5	15/15
Protactinium-231	1.82	0.04	1.82	1.2	15/15
Radium-226[b]	1.42	0.74	1.42	0.95	15/15
Radium-228	1.41	0.75	1.41	0.99	15/15
Thorium-227	0.81	0.25	0.81	0.44	10/10
Thorium-228	1.53	0.78	1.53	1.13	15/15
Thorium-230	2.56	0.83	2.56	1.45	15/15
Thorium-232	1.53	0.84	1.53	1.07	15/15
Uranium-235	0.21	0.04	0.21	0.14	15/15
Uranium-238[a]	2.88	0.10	2.88	1.29	14/15

a Uranium-234 is assumed to be in equilibrium with Uranium-238 and
b Lead-210 is assumed to be in equilibrium with Radium-226.

Table 4.1. Radiological Sample Summary Tables for Painesville FUSRAP Site

Table 4.1.a. Investigative Area A Summary Table

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background (95% UTL)	Background Exceed	Soil PRG	Units
Radiological Parameters										
Radium-226	162/163	0.67	IAA-BH0044(96)	862	IAA-SB0038(00)	16.66	5	77/162	--	pCi/g
Thorium-230	138/157	0.65	IAA-BH0029(96)	422	IAA-SB0010(00)	11.05	2.56	44/138	--	pCi/g
Uranium-238	82/157	0.65	IAA-BH0041(96)	282.7	IAA-SB0031(00)	13.29	2.88	42/82	--	pCi/g

Table 4.1.b Investigative Area B Summary Table

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background (95% UTL)	Background Exceed	Soil PRG	Units
Radiological Parameters										
Radium-226	16/16	0.82	IAB-BH0099(96)	10.64	IAB-BH0089(96)	3.31	1.42	9/16	--	pCi/g
Thorium-230	13/16	1.16	IAB-BH0099(96)	10.47	IAB-SB0001(00)	3.58	2.56	8/13	--	pCi/g
Uranium-238	2/16	1.92	IAB-SB0002(00)	8.35	IAB-SB0001(00)	5.14	2.88	1/2	--	pCi/g

Table 4.1.c Investigative Area C Summary Table

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background (95% UTL)	Background Exceed	Soil PRG	Units
Radiological Parameters										
Radium-226	57/57	0.61	IAC-BH0056(96)	285.05 J	IAC-SB0003(00)	11.75	1.42	32/57	--	pCi/g
Thorium-230	44/53	1.03	IAC-BH0120(96)	311.8	IAC-SB0003(00)	13.43	2.56	23/44	--	pCi/g
Uranium-238	29/57	1.34 J	IAC-SB0002(00)	320.2	IAC-SB0003(00)	20.66	2.88	21/29	--	pCi/g

Table 4.1.d Investigative Area D Summary Table

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background (95% UTL)	Background Exceed	Soil PRG	Units
Radiological Parameters										
Radium-226	20/20	0.38	IAD-BH0072(96)	14.76	IAD-SB0001(00)	3.56	1.42	11/20	--	pCi/g
Thorium-230	16/20	1.58	IAD-BH0061(96)	20.7	IAD-SB0001(00)	6.37	2.56	10/16	--	pCi/g
Uranium-238	7/20	2.13	IAD-SB0003(00)	5.32	IAD-BH0067(96)	3.37	2.88	5/7	--	pCi/g

Table 4.1. Radiological Sample Summary Tables for Painesville FUSRAP Site

Table 4.1.e Investigative Area G Summary Table

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background (95% UTL)	Background Exceed	Soil PRG	Units
Radiological Parameters										
Radium-226	16/16	0.49	IAG-BH0021(96)	22.4	IAG-BH0023(96)	3.13	1.42	7/16	--	pCi/g
Thorium-230	15/16	0.97	IAG-BH0023(96)	13.5	IAG-SB0001(00)	3.08	2.56	6/15	--	pCi/g
Uranium-238	6/16	2	IAG-BH0022(96)	12.12	IAG-BH0023(96)	5.84	2.88	4/6	--	pCi/g

Table 4.1.f Investigative Area I Summary Table

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background (95% UTL)	Background Exceed	Soil PRG	Units
Radiological Parameters										
Radium-226	14/14	0.35	IAI-BH0002(96)	125.11	IAI-BH0047(96)	15.94	1.42	9/14	--	pCi/g
Thorium-230	11/14	1.46	IAI-BH0002(96)	304.2 J	IAI-BH0001(96)	33.26	2.56	5/11	--	pCi/g
Uranium-238	7/14	0.96	IAI-BH0002(96)	44.56	IAI-BH0047(96)	14.25	2.88	6/7	--	pCi/g

Table 4.1.g Investigative Area P1B Summary Table

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background (95% UTL)	Background Exceed	Soil PRG	Units
Radiological Parameters										
Radium-226	16/16	0.69	IAP1B-SB0002(00)	7.42	IAP1B-SB0016(00)	1.46	1.42	2/16	--	pCi/g
Thorium-230	16/16	1.03	IAP1B-SB0009(00)	3.73 J	IAP1B-SB0016(00)	1.51	2.56	1/16	--	pCi/g
Uranium-238	16/16	0.95	IAP1B-SB0010(00)	2.99 J	IAP1B-SB0016(00)	1.55	2.88	1/16	--	pCi/g

Table 4.1.h Investigative Area RP Summary Table

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Background (95% UTL)	Background Exceed	Soil PRG	Units
Radiological Parameters										
Radium-226	19/19	0.64	IARP-BH0065(96)	75.78	IARP-SB0012(00)	7.93	1.42	7/19	--	pCi/g
Thorium-230	19/19	1.22	IARP-BH0065(96)	79.04	IARP-SB0012(00)	7.61	2.56	7/19	--	pCi/g
Uranium-238	13/19	1.31 J	IARP-SB0008(00)	21.96 J	IARP-SB0012(00)	4.53	2.88	4/13	--	pCi/g

Table 4.2 May/June 2001 Groundwater Sampling Results, Painesville FUSRAP Site

Station	**IAA-MW-16**	**IAA-MW-17**	**IAA-MW-29**	**IAA-MW-33S**	**IAA-MW-33S**	**IAA-MW-35S**	**IAA-MW-37**	**IAA-MW-39**	**IAA-MW-40S**
Sample No	**PVGW0001**	**PVGW0002**	**PVGW0003**	**PVGW0004**	**PVGW0004D**	**PVGW0005**	**PVGW0006**	**PVGW0007**	**PVGW0008**
Collection Date	**05/29/2001**	**05/31/2001**	**05/31/2001**	**05/31/2001**	**05/31/2001**	**05/31/2001**	**05/30/2001**	**06/01/2001**	**05/30/2001**
Duplicate ID					**PVGW9000**				
Radiological Parameters (AlphaSpec)									
Radium-226 (Filtered) (pCi/L)	0.51 U	1.03 U	0.45 U	0.92 U	4.25	0.22 U	0.92 U	0.44 U	0.83 U
Radium-226 (pCi/L)	0.74 U	0.78 U	6.05	1.14 U	1.09 U	0.26 U	-0.17 U	0.43 U	0.39 U
Thorium-228 (Filtered) (pCi/L)	0.01 U	0.08 U	0.09 U	0.19 U	1.21 J	0.18 U	0.69 J	0.19 U	0.37 U
Thorium-228 (pCi/L)	0.11 U	0.14 U	4.12	0.36 U	0.18 U	0.02 U	0.13 U	0.33 U	0.05 U
Thorium-230 (Filtered) (pCi/L)	0.15 U	0.73 J	0.29 U	0.17 U	0.72 J	0.23 U	0.44 U	0.7 J	0.28 U
Thorium-230 (pCi/L)	0.19 U	0.36 U	4.3	0.91 J	0.83 J	0.48 U	0.16 U	1.09 J	0.33 U
Thorium-232 (Filtered) (pCi/L)	0.05 U	-0.06 U	0.1 U	-0.02 U	0.05 U	0.07 U	0.08 U	-0.04 U	0.13 U
Thorium-232 (pCi/L)	-0.05 U	0 U	4.03	0.26 U	0.16 U	0.02 U	-0.01 U	0.02 U	0.02 U
Uranium-234 (Filtered) (pCi/L)	1.09	1.98	0.22 U	1.2 J	1.34 J	0.21 U	1.34 J	6.14	1.4 J
Uranium-234 (pCi/L)	0.44 U	1.08 U	2.48	1.33 J	0.58 U	0.34 U	2.44	6.31	1.59
Uranium-235 (Filtered) (pCi/L)	0.02 U	0.26 U	0.05 U	0.14 U	-0.02 U	0.05 U	0.17 U	0.25 U	0.32 U
Uranium-235 (pCi/L)	0.02 U	0.17 U	0.29 U	0.13 U	0.18 U	0.24 U	0.23 U	-0.07 U	0.05 U
Uranium-238 (Filtered) (pCi/L)	0.32 J	1.32 J	0 U	0.03 U	0.38 U	0.23 U	1.23 J	3.89	1.44 J
Uranium-238 (pCi/L)	0.52 J	1.23 J	1.22 J	0.44 U	0.51 J	0.61 J	1.21 J	3.77	1.06

U - Not detected

J - Estimated

MCL's for Groundwater Radium-226 + Radium-228 - 5 pCi/L, Uranium - 30ug/L (~27pCi/L)

Table 4.3.a Chemical Sample Summary Table: Investigative Area A

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Units
Metals							
Aluminum	15/15	7810 J	IAA-SB0030(00)	12700	IAA-SB0015(00)	9982.67	mg/kg
Antimony	15/15	0.26 J	IAA-SB0030(00)	17	IAA-SB0025(00)	1.69	mg/kg
Arsenic	15/15	7.8	IAA-SB0013(00)	40.3	IAA-SB0025(00)	15.03	mg/kg
Barium	15/15	64.7	IAA-SB0017(00)	525	IAA-SB0023(00)	170.09	mg/kg
Beryllium	15/15	0.45	IAA-SB0030(00)	1.3	IAA-SB0023(00)	0.67	mg/kg
Cadmium	14/15	0.05	IAA-SB0017(00)	2.2	IAA-SB0023(00)	0.56	mg/kg
Calcium	15/15	5070	IAA-SB0037(00)	30900	IAA-SB0023(00)	12543.33	mg/kg
Chromium	15/15	21.4	IAA-SB0017(00)	111 J	IAA-SB0033(00)	59.35	mg/kg
Cobalt	15/15	5.4	IAA-SB0017(00)	15.2	IAA-SB0031(00)	10.51	mg/kg
Copper	15/15	16.8	IAA-SB0017(00)	641 J	IAA-SB0031(00)	174.03	mg/kg
Cyanide	2/14	0.32 J	IAA-SB0036(00)	0.42 J	IAA-SB0033(00)	0.37	mg/kg
Iron	15/15	18600	IAA-SB0017(00)	51500	IAA-SB0023(00)	34300	mg/kg
Lead	15/15	15.4	IAA-SB0013(00)	246	IAA-SB0036(00)	91.73	mg/kg
Magnesium	15/15	2060	IAA-SB0007(00)	6460	IAA-SB0023(00)	4530	mg/kg
Manganese	15/15	164	IAA-SB0017(00)	854	IAA-SB0023(00)	506.73	mg/kg
Mercury	15/15	0.03	IAA-SB0007(00)	0.46	IAA-SB0031(00)	0.16	mg/kg
Nickel	15/15	14.2	IAA-SB0017(00)	692 J	IAA-SB0031(00)	82.84	mg/kg
Potassium	15/15	802	IAA-SB0030(00)	1930	IAA-SB0015(00)	1342.8	mg/kg
Selenium	11/15	0.7	IAA-SB0030(00)	2.5	IAA-SB0023(00)	1.29	mg/kg
Silver	2/15	0.13	IAA-SB0031(00)	0.19	IAA-SB0036(00)	0.16	mg/kg
Sodium	15/15	68.1	IAA-SB0017(00)	1510	IAA-SB0037(00)	246.04	mg/kg
Thallium	8/15	0.42	IAA-SB0023(00)	1.2	IAA-SB0007(00)	0.61	mg/kg
Vanadium	15/15	15.8	IAA-SB0013(00)	21.7	IAA-SB0015(00)	18.49	mg/kg
Zinc	15/15	58.7	IAA-SB0017(00)	631	IAA-SB0023(00)	201.63	mg/kg
PCBs							
Aroclor-1254	12/15	33 J	IAA-SB0032(00)	3300	IAA-SB0023(00)	1072.83	µg/kg
Pesticides							
4,4'-DDT	5/15	70	IAA-SB0025(00)	250	IAA-SB0023(00)	123.2	µg/kg
Aldrin	1/15	5.4	IAA-SB0033(00)	5.4	IAA-SB0033(00)	5.4	µg/kg
Dieldrin	1/15	63	IAA-SB0002(00)	63	IAA-SB0002(00)	63	µg/kg
Endrin ketone	1/15	2.3 J	IAA-SB0033(00)	2.3 J	IAA-SB0033(00)	2.3	µg/kg
Semivolatile Organics							
2-Methylnaphthalene	3/15	50 J	IAA-SB0007(00)	480 J	IAA-SB0002(00)	276.67	µg/kg
Acenaphthene	1/15	750 J	IAA-SB0034(00)	750 J	IAA-SB0034(00)	750	µg/kg
Acenaphthylene	1/15	1400 J	IAA-SB0034(00)	1400 J	IAA-SB0034(00)	1400	µg/kg
Anthracene	3/15	97 J	IAA-SB0002(00)	4000 J	IAA-SB0034(00)	1452.33	µg/kg
Benzo(a)anthracene	9/15	85 J	IAA-SB0007(00)	14000	IAA-SB0034(00)	1880.56	µg/kg
Benzo(a)pyrene	9/15	82 J	IAA-SB0007(00)	10000	IAA-SB0034(00)	1441.33	µg/kg
Benzo(b)fluoranthene	9/15	79 J	IAA-SB0007(00)	9000	IAA-SB0034(00)	1356.56	µg/kg
Benzo(g,h,i)perylene	6/15	49 J	IAA-SB0007(00)	6500 J	IAA-SB0034(00)	1336.5	µg/kg
Benzo(k)fluoranthene	8/15	89 J	IAA-SB0007(00)	11000	IAA-SB0034(00)	1727.38	µg/kg
Chrysene	11/15	110 J	IAA-SB0007(00)	13000	IAA-SB0034(00)	1560	µg/kg
Dibenz(a,h)anthracene	1/15	2800 J	IAA-SB0034(00)	2800 J	IAA-SB0034(00)	2800	µg/kg
Dibenzofuran	3/15	18 J	IAA-SB0007(00)	750 J	IAA-SB0034(00)	312.67	µg/kg
Fluoranthene	11/15	150 J	IAA-SB0007(00)	33000	IAA-SB0034(00)	3588.18	µg/kg
Fluorene	1/15	1900 J	IAA-SB0034(00)	1900 J	IAA-SB0034(00)	1900	µg/kg
Indeno(1,2,3-cd)pyrene	6/15	46 J	IAA-SB0007(00)	6000 J	IAA-SB0034(00)	1236	µg/kg
Naphthalene	3/15	30 J	IAA-SB0007(00)	560 J	IAA-SB0034(00)	276.67	µg/kg
Phenanthrene	7/15	98 J	IAA-SB0007(00)	19000	IAA-SB0034(00)	3206.86	µg/kg
Pyrene	10/15	170 J	IAA-SB0007(00)	27000	IAA-SB0034(00)	3263	µg/kg
bis(2-Ethylhexyl)phthalate	1/15	220 J	IAA-SB0032(00)	220 J	IAA-SB0032(00)	220	µg/kg

Table 4.3.a Chemical Sample Summary Table: Investigative Area A

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Units
Volatile Organics							
Acetone	2/16	13 B	IAA-SB0013(00)	72 B	IAA-SB0007(00)	42.5	µg/kg
Benzene	2/16	1 J	IAA-SB0031(00)	1 J	IAA-SB0037(00)	1	µg/kg
Carbon Disulfide	9/16	1 J	IAA-SB0036(00)	10	IAA-SB0037(00)	4.56	µg/kg
Tetrachloroethene	1/16	6	IAA-SB0032(00)	6	IAA-SB0032(00)	6	µg/kg
Toluene	6/16	1 J	IAA-SB0015(00)	5 J	IAA-SB0017(00)	2.17	µg/kg
Trichloroethene	1/16	1 J	IAA-SB0037(00)	1 J	IAA-SB0037(00)	1	µg/kg
Xylene (total)	1/16	1 J	IAA-SB0030(00)	1 J	IAA-SB0030(00)	1	µg/kg

Table 4.3.b Chemical Sample Summary Table: Investigative Area B

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Units
Metals							
Aluminum	2/2	13100	IAB-SB0002(00)	18900	IAB-SB0001(00)	16000	mg/kg
Antimony	1/2	0.57	IAB-SB0001(00)	0.57	IAB-SB0001(00)	0.57	mg/kg
Arsenic	2/2	11.4	IAB-SB0001(00)	14.9	IAB-SB0002(00)	13.15	mg/kg
Barium	2/2	100	IAB-SB0002(00)	636	IAB-SB0001(00)	368	mg/kg
Beryllium	2/2	0.85	IAB-SB0002(00)	2.8	IAB-SB0001(00)	1.83	mg/kg
Cadmium	1/2	0.34	IAB-SB0001(00)	0.34	IAB-SB0001(00)	0.34	mg/kg
Calcium	2/2	14700	IAB-SB0002(00)	133000	IAB-SB0001(00)	73850	mg/kg
Chromium	2/2	29.9	IAB-SB0002(00)	49.7	IAB-SB0001(00)	39.8	mg/kg
Cobalt	2/2	4.4	IAB-SB0001(00)	11	IAB-SB0002(00)	7.7	mg/kg
Copper	2/2	29.7	IAB-SB0002(00)	74.3	IAB-SB0001(00)	52	mg/kg
Iron	2/2	24300	IAB-SB0001(00)	30300	IAB-SB0002(00)	27300	mg/kg
Lead	2/2	28.4	IAB-SB0002(00)	50.8	IAB-SB0001(00)	39.6	mg/kg
Magnesium	2/2	5830	IAB-SB0002(00)	14600	IAB-SB0001(00)	10215	mg/kg
Manganese	2/2	522	IAB-SB0002(00)	2410	IAB-SB0001(00)	1466	mg/kg
Mercury	2/2	0.03	IAB-SB0002(00)	0.13	IAB-SB0001(00)	0.08	mg/kg
Nickel	2/2	21.6	IAB-SB0001(00)	28.1	IAB-SB0002(00)	24.85	mg/kg
Potassium	2/2	1350	IAB-SB0002(00)	1960	IAB-SB0001(00)	1655	mg/kg
Selenium	2/2	0.59	IAB-SB0002(00)	1.4	IAB-SB0001(00)	1	mg/kg
Sodium	2/2	119	IAB-SB0002(00)	759	IAB-SB0001(00)	439	mg/kg
Thallium	1/2	0.7	IAB-SB0002(00)	0.7	IAB-SB0002(00)	0.7	mg/kg
Vanadium	2/2	14.3	IAB-SB0001(00)	18.6	IAB-SB0002(00)	16.45	mg/kg
Zinc	2/2	72.5	IAB-SB0002(00)	77	IAB-SB0001(00)	74.75	mg/kg
PCBs							
Aroclor-1254	1/2	170	IAB-SB0001(00)	170	IAB-SB0001(00)	170	µg/kg
Semivolatile Organics							
Anthracene	1/2	210 J	IAB-SB0002(00)	210 J	IAB-SB0002(00)	210	µg/kg
Benzo(a)anthracene	2/2	400 J	IAB-SB0001(00)	680 J	IAB-SB0002(00)	540	µg/kg
Benzo(a)pyrene	2/2	350 J	IAB-SB0001(00)	550 J	IAB-SB0002(00)	450	µg/kg
Benzo(b)fluoranthene	2/2	320 J	IAB-SB0001(00)	530 J	IAB-SB0002(00)	425	µg/kg
Benzo(k)fluoranthene	2/2	390 J	IAB-SB0001(00)	560 J	IAB-SB0002(00)	475	µg/kg
Chrysene	2/2	490 J	IAB-SB0001(00)	710 J	IAB-SB0002(00)	600	µg/kg
Fluoranthene	2/2	860 J	IAB-SB0001(00)	1800 J	IAB-SB0002(00)	1330	µg/kg
Indeno(1,2,3-cd)pyrene	1/2	270 J	IAB-SB0002(00)	270 J	IAB-SB0002(00)	270	µg/kg
Phenanthrene	2/2	410 J	IAB-SB0001(00)	960 J	IAB-SB0002(00)	685	µg/kg
Pyrene	2/2	750 J	IAB-SB0001(00)	1300 J	IAB-SB0002(00)	1025	µg/kg
Volatile Organics							
Carbon Disulfide	2/2	2 J	IAB-SB0002(00)	5 J	IAB-SB0001(00)	3.5	µg/kg

Table 4.3.c. Chemical Sample Summary Table: Investigative Area D

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Units
Metals							
Aluminum	1/1	13200	IAD-SB0004(00)	13200	IAD-SB0004(00)	13200	mg/kg
Antimony	1/1	0.2	IAD-SB0004(00)	0.2	IAD-SB0004(00)	0.2	mg/kg
Arsenic	1/1	7.7	IAD-SB0004(00)	7.7	IAD-SB0004(00)	7.7	mg/kg
Barium	1/1	205	IAD-SB0004(00)	205	IAD-SB0004(00)	205	mg/kg
Beryllium	1/1	1.6	IAD-SB0004(00)	1.6	IAD-SB0004(00)	1.6	mg/kg
Cadmium	1/1	0.43	IAD-SB0004(00)	0.43	IAD-SB0004(00)	0.43	mg/kg
Calcium	1/1	91400	IAD-SB0004(00)	91400	IAD-SB0004(00)	91400	mg/kg
Chromium	1/1	42	IAD-SB0004(00)	42	IAD-SB0004(00)	42	mg/kg
Cobalt	1/1	4.2	IAD-SB0004(00)	4.2	IAD-SB0004(00)	4.2	mg/kg
Copper	1/1	43.8	IAD-SB0004(00)	43.8	IAD-SB0004(00)	43.8	mg/kg
Iron	1/1	19900	IAD-SB0004(00)	19900	IAD-SB0004(00)	19900	mg/kg
Lead	1/1	99.2	IAD-SB0004(00)	99.2	IAD-SB0004(00)	99.2	mg/kg
Magnesium	1/1	24800	IAD-SB0004(00)	24800	IAD-SB0004(00)	24800	mg/kg
Manganese	1/1	1480	IAD-SB0004(00)	1480	IAD-SB0004(00)	1480	mg/kg
Mercury	1/1	0.07	IAD-SB0004(00)	0.07	IAD-SB0004(00)	0.07	mg/kg
Nickel	1/1	16.6	IAD-SB0004(00)	16.6	IAD-SB0004(00)	16.6	mg/kg
Potassium	1/1	1380	IAD-SB0004(00)	1380	IAD-SB0004(00)	1380	mg/kg
Selenium	1/1	0.83	IAD-SB0004(00)	0.83	IAD-SB0004(00)	0.83	mg/kg
Sodium	1/1	484	IAD-SB0004(00)	484	IAD-SB0004(00)	484	mg/kg
Vanadium	1/1	11.9	IAD-SB0004(00)	11.9	IAD-SB0004(00)	11.9	mg/kg
Zinc	1/1	97.3	IAD-SB0004(00)	97.3	IAD-SB0004(00)	97.3	mg/kg
Semivolatile Organics							
Anthracene	1/1	190 J	IAD-SB0004(00)	190 J	IAD-SB0004(00)	190	µg/kg
Benzo(a)anthracene	1/1	1200 J	IAD-SB0004(00)	1200 J	IAD-SB0004(00)	1200	µg/kg
Benzo(a)pyrene	1/1	1100 J	IAD-SB0004(00)	1100 J	IAD-SB0004(00)	1100	µg/kg
Benzo(b)fluoranthene	1/1	1200 J	IAD-SB0004(00)	1200 J	IAD-SB0004(00)	1200	µg/kg
Benzo(g,h,i)perylene	1/1	760 J	IAD-SB0004(00)	760 J	IAD-SB0004(00)	760	µg/kg
Benzo(k)fluoranthene	1/1	1200 J	IAD-SB0004(00)	1200 J	IAD-SB0004(00)	1200	µg/kg
Carbazole	1/1	130 J	IAD-SB0004(00)	130 J	IAD-SB0004(00)	130	µg/kg
Chrysene	1/1	1500 J	IAD-SB0004(00)	1500 J	IAD-SB0004(00)	1500	µg/kg
Dibenz(a,h)anthracene	1/1	310 J	IAD-SB0004(00)	310 J	IAD-SB0004(00)	310	µg/kg
Fluoranthene	1/1	3300	IAD-SB0004(00)	3300	IAD-SB0004(00)	3300	µg/kg
Hexachlorobenzene	1/1	120 J	IAD-SB0004(00)	120 J	IAD-SB0004(00)	120	µg/kg
Indeno(1,2,3-cd)pyrene	1/1	760 J	IAD-SB0004(00)	760 J	IAD-SB0004(00)	760	µg/kg
Phenanthrene	1/1	1500 J	IAD-SB0004(00)	1500 J	IAD-SB0004(00)	1500	µg/kg
Pyrene	1/1	2400	IAD-SB0004(00)	2400	IAD-SB0004(00)	2400	µg/kg
bis(2-Ethylhexyl)phthalate	1/1	360 J	IAD-SB0004(00)	360 J	IAD-SB0004(00)	360	µg/kg
Volatile Organics							
Carbon Disulfide	1/1	3 J	IAD-SB0004(00)	3 J	IAD-SB0004(00)	3	µg/kg

Table 4.3.d. Chemical Sample Summary Table: Investigative Area P1B

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Units
Metals							
Aluminum	6/6	6820	IAP1B-SB0009(00)	12800	IAP1B-SB0012(00)	9541.67	mg/kg
Antimony	6/6	0.22	IAP1B-SB0008(00)	1.2	IAP1B-SB0016(00)	0.45	mg/kg
Arsenic	6/6	7.4	IAP1B-SB0005(00)	15.1	IAP1B-SB0016(00)	11.68	mg/kg
Barium	6/6	52.7	IAP1B-SB0009(00)	95.6	IAP1B-SB0012(00)	69.67	mg/kg
Beryllium	6/6	0.36	IAP1B-SB0016(00)	34	IAP1B-SB0009(00)	6.23	mg/kg
Cadmium	4/6	0.04	IAP1B-SB0007(00)	0.07	IAP1B-SB0009(00)	0.05	mg/kg
Calcium	6/6	4450	IAP1B-SB0016(00)	36700	IAP1B-SB0012(00)	17341.67	mg/kg
Chromium	6/6	11.6	IAP1B-SB0009(00)	24.9	IAP1B-SB0016(00)	18.82	mg/kg
Cobalt	6/6	5.9	IAP1B-SB0009(00)	11.8	IAP1B-SB0008(00)	8.2	mg/kg
Copper	6/6	21.9	IAP1B-SB0005(00)	202	IAP1B-SB0016(00)	59.67	mg/kg
Iron	6/6	17400	IAP1B-SB0012(00)	40200	IAP1B-SB0016(00)	25766.67	mg/kg
Lead	6/6	14.3	IAP1B-SB0008(00)	42.3	IAP1B-SB0012(00)	24.9	mg/kg
Magnesium	6/6	3240	IAP1B-SB0016(00)	9960	IAP1B-SB0008(00)	5675	mg/kg
Manganese	6/6	207	IAP1B-SB0016(00)	1270	IAP1B-SB0012(00)	489.67	mg/kg
Mercury	6/6	0.02	IAP1B-SB0012(00)	0.05	IAP1B-SB0016(00)	0.03	mg/kg
Nickel	6/6	13.5	IAP1B-SB0012(00)	42.4	IAP1B-SB0016(00)	24.28	mg/kg
Potassium	6/6	774	IAP1B-SB0005(00)	2480	IAP1B-SB0008(00)	1360.67	mg/kg
Selenium	1/6	0.51	IAP1B-SB0012(00)	0.51	IAP1B-SB0012(00)	0.51	mg/kg
Sodium	6/6	77.3	IAP1B-SB0016(00)	487	IAP1B-SB0012(00)	217.05	mg/kg
Thallium	1/6	0.54	IAP1B-SB0012(00)	0.54	IAP1B-SB0012(00)	0.54	mg/kg
Vanadium	6/6	11.7	IAP1B-SB0009(00)	18.6	IAP1B-SB0008(00)	15.53	mg/kg
Zinc	6/6	45.2	IAP1B-SB0012(00)	94.4	IAP1B-SB0016(00)	68.58	mg/kg
PCBs							
Aroclor-1254	1/6	2400	IAP1B-SB0016(00)	2400	IAP1B-SB0016(00)	2400	µg/kg
Pesticides							
4,4'-DDE	1/6	53	IAP1B-SB0016(00)	53	IAP1B-SB0016(00)	53	µg/kg
4,4'-DDT	1/6	200	IAP1B-SB0016(00)	200	IAP1B-SB0016(00)	200	µg/kg
Decachlorobiphenyl	4/4	0 D	IAP1B-SB0005(00)	283 *	IAP1B-SB0009(00)	119.75	µg/kg
Delta-BHC	1/6	14	IAP1B-SB0007(00)	14	IAP1B-SB0007(00)	14	µg/kg
Dieldrin	1/6	97	IAP1B-SB0016(00)	97	IAP1B-SB0016(00)	97	µg/kg
Tetrachloro-m-xylene	4/4	0 D	IAP1B-SB0005(00)	110	IAP1B-SB0009(00)	74.5	µg/kg
Semivolatile Organics							
2,4,6-Tribromophenol	4/4	94	IAP1B-SB0005(00)	108	IAP1B-SB0009(00)	102.5	µg/kg
2-Fluorobiphenyl	4/4	93	IAP1B-SB0005(00)	106	IAP1B-SB0008(00)	100	µg/kg
2-Fluorophenol	4/4	95	IAP1B-SB0007(00)	113	IAP1B-SB0009(00)	105.25	µg/kg
Acenaphthene	1/6	120 J	IAP1B-SB0016(00)	120 J	IAP1B-SB0016(00)	120	µg/kg
Benzo(a)anthracene	5/6	42 J	IAP1B-SB0005(00)	510 J	IAP1B-SB0016(00)	173.8	µg/kg
Benzo(a)pyrene	5/6	40 J	IAP1B-SB0005(00)	180 J	IAP1B-SB0016(00)	96.6	µg/kg
Benzo(b)fluoranthene	6/6	40 J	IAP1B-SB0008(00)	260 J	IAP1B-SB0016(00)	105.33	µg/kg
Benzo(g,h,i)perylene	5/6	29 J	IAP1B-SB0007(00)	100 J	IAP1B-SB0016(00)	53.4	µg/kg
Benzo(k)fluoranthene	6/6	39 J	IAP1B-SB0008(00)	260 J	IAP1B-SB0016(00)	103.5	µg/kg
Chrysene	6/6	51 J	IAP1B-SB0008(00)	560 J	IAP1B-SB0016(00)	175	µg/kg
Fluoranthene	6/6	44 J	IAP1B-SB0008(00)	1600 J	IAP1B-SB0016(00)	387.67	µg/kg
Hexachlorobenzene	2/6	39 J	IAP1B-SB0008(00)	41 J	IAP1B-SB0009(00)	40	µg/kg
Indeno(1,2,3-cd)pyrene	4/6	26 J	IAP1B-SB0005(00)	98 J	IAP1B-SB0016(00)	52.75	µg/kg
Naphthalene	2/6	40 J	IAP1B-SB0005(00)	100 J	IAP1B-SB0007(00)	70	µg/kg
Phenanthrene	4/6	53 J	IAP1B-SB0005(00)	480 J	IAP1B-SB0012(00)	176.25	µg/kg
Pyrene	6/6	43 J	IAP1B-SB0008(00)	1300 J	IAP1B-SB0016(00)	335.17	µg/kg
bis(2-Ethylhexyl)phthalate	1/6	44 J	IAP1B-SB0008(00)	44 J	IAP1B-SB0008(00)	44	µg/kg
Volatile Organics							
1,1-Dichloroethene	1/6	19	IAP1B-SB0005(00)	19	IAP1B-SB0005(00)	19	µg/kg
Benzene	2/6	1 J	IAP1B-SB0007(00)	1 J	IAP1B-SB0016(00)	1	µg/kg
Bromofluorobenzene	4/4	60 *	IAP1B-SB0007(00)	106	IAP1B-SB0009(00)	80.5	µg/kg
Carbon Disulfide	6/6	2 J	IAP1B-SB0005(00)	4 J	IAP1B-SB0012(00)	2.5	µg/kg
Toluene	3/6	1 J	IAP1B-SB0007(00)	4 J	IAP1B-SB0016(00)	2	µg/kg

Table 4.3.d. Chemical Sample Summary Table: Investigative Area P1B

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Units
Vinyl Chloride	1/6	44	IAP1B-SB0005(00)	44	IAP1B-SB0005(00)	44	μg/kg
Xylene (total)	1/6	1 J	IAP1B-SB0016(00)	1 J	IAP1B-SB0016(00)	1	μg/kg

Table 4.3.e. Chemical Sample Summary Table: Investigative Area RP

Parameter	Detection Frequency	Minimum Value	Minimum Location	Maximum Value	Maximum Location	Average Value	Units
Metals							
Aluminum	3/3	9770 J	IARP-SB0002(00)	13200 J	IARP-SB0006(00)	11656.67	mg/kg
Antimony	3/3	0.26 J	IARP-SB0002(00)	0.65 J	IARP-SB0005(00)	0.45	mg/kg
Arsenic	3/3	6	IARP-SB0002(00)	16.7	IARP-SB0005(00)	11.3	mg/kg
Barium	3/3	78.5 J	IARP-SB0002(00)	109 J	IARP-SB0006(00)	93.33	mg/kg
Beryllium	3/3	0.56 J	IARP-SB0002(00)	0.74 J	IARP-SB0006(00)	0.67	mg/kg
Cadmium	2/3	0.03 J	IARP-SB0002(00)	0.07 J	IARP-SB0005(00)	0.05	mg/kg
Calcium	3/3	3820 J	IARP-SB0002(00)	15200 J	IARP-SB0005(00)	9873.33	mg/kg
Chromium	3/3	12.5 J	IARP-SB0002(00)	33 J	IARP-SB0006(00)	24.53	mg/kg
Cobalt	3/3	3.8	IARP-SB0002(00)	14.1	IARP-SB0005(00)	9.03	mg/kg
Copper	3/3	12.9 J	IARP-SB0002(00)	36.8 J	IARP-SB0005(00)	24.87	mg/kg
Iron	3/3	15800 J	IARP-SB0002(00)	32200 J	IARP-SB0005(00)	24466.67	mg/kg
Lead	3/3	11.7 J	IARP-SB0002(00)	23.3 J	IARP-SB0005(00)	19.37	mg/kg
Magnesium	3/3	1670 J	IARP-SB0002(00)	7550 J	IARP-SB0005(00)	4590	mg/kg
Manganese	3/3	66.1 J	IARP-SB0002(00)	463 J	IARP-SB0006(00)	321.7	mg/kg
Mercury	3/3	0.03 J	IARP-SB0002(00)	0.1 J	IARP-SB0005(00)	0.06	mg/kg
Nickel	3/3	11.8 J	IARP-SB0002(00)	33 J	IARP-SB0005(00)	23.07	mg/kg
Potassium	3/3	614 J	IARP-SB0002(00)	1580 J	IARP-SB0005(00)	1211.33	mg/kg
Selenium	2/3	0.46 J	IARP-SB0005(00)	0.49 J	IARP-SB0006(00)	0.48	mg/kg
Sodium	3/3	155	IARP-SB0005(00)	172	IARP-SB0002(00)	161	mg/kg
Vanadium	3/3	16.1	IARP-SB0002(00)	21	IARP-SB0005(00)	18.83	mg/kg
Zinc	3/3	35.2 J	IARP-SB0002(00)	88 J	IARP-SB0005(00)	66.8	mg/kg
PCBs							
Aroclor-1260	1/3	180	IARP-SB0006(00)	180	IARP-SB0006(00)	180	µg/kg
Semivolatile Organics							
Benzo(a)anthracene	1/3	220 J	IARP-SB0006(00)	220 J	IARP-SB0006(00)	220	µg/kg
Benzo(a)pyrene	2/3	93 J	IARP-SB0005(00)	200 J	IARP-SB0006(00)	146.5	µg/kg
Benzo(b)fluoranthene	2/3	130 J	IARP-SB0005(00)	300 J	IARP-SB0006(00)	215	µg/kg
Benzo(g,h,i)perylene	1/3	150 J	IARP-SB0006(00)	150 J	IARP-SB0006(00)	150	µg/kg
Benzo(k)fluoranthene	1/3	240 J	IARP-SB0006(00)	240 J	IARP-SB0006(00)	240	µg/kg
Chrysene	2/3	140 J	IARP-SB0005(00)	320 J	IARP-SB0006(00)	230	µg/kg
Fluoranthene	2/3	130 J	IARP-SB0005(00)	450 J	IARP-SB0006(00)	290	µg/kg
Indeno(1,2,3-cd)pyrene	1/3	150 J	IARP-SB0006(00)	150 J	IARP-SB0006(00)	150	µg/kg
Phenanthrene	1/3	200 J	IARP-SB0006(00)	200 J	IARP-SB0006(00)	200	µg/kg
Pyrene	2/3	190 J	IARP-SB0005(00)	480 J	IARP-SB0006(00)	335	µg/kg
Volatile Organics							
Carbon Disulfide	1/3	2 J	IARP-SB0006(00)	2 J	IARP-SB0006(00)	2	µg/kg
Toluene	1/3	2 J	IARP-SB0006(00)	2 J	IARP-SB0006(00)	2	µg/kg

Table 4.4 Summary of Geotechnical Results, Painesville FUSRAP Site

ASTM Method:			D2116	D4318		D422		Visual Classification
Sample Station	Sample ID	Depth[1] (ft bgs)	Moisture Content (%)	Atterburg Limits LL (%)	PL (%)	Grain Size Distribution Sand (%)	Fines (%)	
IAA-SB0004	PVSB0011	4.0-5.5	16.5	27.7	21.2	16.0	84.0	Silt (ML)
IAA-SB0007	PVSB0020	8.0-9.4	20.5	31.7	23.4	10.0	90.0	Clay (CL)
IAA-SB0013	PVSB0038	6.0-8.0	18.7	28.0	22.2	13.8	86.2	Sandy Silty Clay (CL-ML)
IAA-SB0014	PVSB0041	8.0-9.5	10.3	*	*	95.9	4.1	Poorly Graded Sands (SP)
IAA-SB0019	PVSB0056	12.0-14.0	22.9	28.2	21.5	13.1	86.9	Sandy Silty Clay (CL-ML)
IAA-SB0025	PVSB0073	6.0-8.0	18.1	28.4	22.9	17.3	82.7	Silt (ML)
IAA-SB0027	PVSB0079	8.0-10.0	23.0	*	*	49.2	50.8	Silt (ML)
IAA-SB0029	PVSB0085	8.0-10.0	18.7	27.8	20.4	13.1	86.9	Lean Clay with Sand (CL)
IAA-SB0031	PVSB0091	8.0-9.0	25.1	24.0	20.2	45.1	54.9	Silt (ML)
IAA-SB0032	PVSB0094	8.0-10.0	16.8	27.6	21.6	12.9	87.1	Sandy Silty Clay (CL-ML)
IAA-SB0035	PVSB0103	8.0-10.0	16.1	26.6	20.6	15.5	84.5	Sandy Silty Clay (CL-ML)
IAP1B-SB0005	PVSB0128	8.0-9.3	17.6	31.4	24.3	19.8	80.2	Lean Clay with Sand (CL)
IAP1B-SB0007	PVSB0134	5.0-6.7	16.7	30.0	24.2	17.3	82.7	Silt (ML)
IAP1B-SB0009	PVSB0140	8.0-10.3	13.5	24.8	19.6	11.7	88.3	Sandy Silty Clay (CL-ML)
IAP1B-SB0010	PVSB0143	4.0-6.3	18.6	29.7	21.8	15.0	85.0	Sandy Silty Clay (CL-ML)
IAP1B-SB0011	PVSB0146	8.0-10.3	22.0	28.4	22.2	11.0	89.0	Sandy Silty Clay (CL-ML)
IAP1B-SB0015	PVSB0158	12.0-14.3	15.4	24.0	20.2	9.8	90.2	Silt (ML)
IARP-SB0001	PVSB0164	8.0-10.3	22.9	29.1	25.6	8.2	91.6	Silt (ML)
IARP-SB0006	PVSB0179	8.0-10.2	22.4	*	*	3.4	96.6	Silt (ML)
IARP-SB0008	PVSB0185	8.0-9.5	18.3	25.2	21.1	11.3	88.7	Sandy Silty Clay (CL-ML)

[1]depth of shelby tube sample
ASTM -- American Society for Testing and Materials
bgs -- below ground surface

* not plastic
LL -- liquid limit
PL -- plastic limit

Table 4.5. Summary of Investigative Area's Contaminated Volumes and Areas

Painesville FUSRAP Site
Soil Removal Estimates

Investigative Area	Subsistence Farmer		Industrial	
	Estimated Area Sq. Feet	Estimated Volume Cu. Yards	Estimated Area Sq. Feet	Estimated Volume Cu. Yards
Area A	26,791	1920	8,685	540
Area B	10,010	600	82	10
Area C	14,607	890	2,602	100
Area D	4,338	160	138	10
Area G	1,302	40	97	10
Area I	5,737	310	810	30
Rubble Pile	3,025	140	934	30
Totals	65,810	4060	13348	730

The estimated areas and volumes are based upon the 10 CFR 20 action level of 25 mrem/yr. Using the analyzed concentrations of Ra-226, Th-230, and U-238 a Sum of Ratios (SOR) was developed. Where the SOR was greater than or equal to One (1) the 25 mrem/yr level was also exceeded. An SOR Limit was extrapolated within Earth Vision to arrive at the calulated areas and volumes.

Table 5.1. Tabular Presentation of the Site Conceptual Model

Painesville FUSRAP Site; Focused RI/FS Report

Primary Source	Primary Release Mechanism	Secondary Source	Secondary Release Mechanism	Potential Exposure Pathways
Scrap metal	1. Leaks from process piping and drains 2. Infiltration 3. Spills, leaks, and dumping 4. Shipment and storage of process materials 5. Past deposition in ventilation system 6. Surface water runoff	1. Surface soil 2. Subsurface soil 3. Groundwater 4. Surface water 5. Ditch sediment	1. Volatilization and wind erosion 2. Dissolution in water 3. Surface water runoff/soil erosion	1. Dust and vapor inhalation 2. Dermal contact and incidental ingestion of surface water 3. Dermal contact and incidental ingestion of sediments 4. Dermal contact and incidental ingestion of surface soil 5. Groundwater consumption

Note: shaded sources and pathways are not active at Painesville.

Table 5.2 SESOIL Input Parameters for Soil Characteristics

Painesville FUSRAP Site; Focused RI/FS Report

Parameter	Value	Source/Comment
Soil Type	Clay	Painesville site-specific
Bulk Density (g/cm^3)	1.8	Published bulk density values for clays are approximately 1.8 g/cm3 (Hern and Melancon, 1986: Evert et.al., 1984.). No site-specific bulk density values are available; however, site-specific samples had a dry specific gravity range (excluding void volume) of 2.56 to 2.74. Assuming a porosity value of 0.31, the bulk density range (=s.g.*(1-porosity)) is 1.77 to 1.89 g/cm3. This range brackets the published bulk density values for clays.
Instrinsic Permeability (cm^2)	1.10E-10	Site-specific hydraulic conductivity range of 8.5e-05 to 6.5e-06 cm/s equates to instrinsic permeability range of 8.5e-10 to 6.5e-11 cm2. The high-end value of 8.5e-10 cm2 (which would result in faster leaching than the low-end value) yielded recharge to groundwater of ~30 cm/yr, well above the expected range of 0 to 5 cm/yr. Calibration to ~5 cm/yr recharge to groundwater was achieved at an instrinsic permeability of 1.1e-10, within the site-specific range of permeability values.
Disconnectedness Index (unitless)	12	Calibrated value (SESOIL default for clay)
Porosity (unitless)	0.31	Published porosity ranges for clays and silts are 0.33-0.60 and 0.35-0.50, respectively (Fetter, C.W., Applied Hydrogeology, 1988). Value at the lower end of this range was selected in order to yield a bulk density within the published range for clays, given the available site-specific dry specific gravity values (see 'bulk density' comments above). Porosity value at lower end of published ranges also yields a calibrated soil moisture content in agreement with observed site-specific values (see 'moisture content' comments below).
Organic Carbon Content (%)	NA	foc (and Koc) not specified for modeling of inorganics. Kd specified instead for each inorganic.
Freundlich Equation Exponent	1	SESOIL default. Implies a linear model for adsorption (I.e., the pollutant adsorbed concentration equals the product of Kd [pollutant partitioning coefficient] and the pollutant concentration in soil moisture)
Recharge to Groundwater (cm/yr)	5.5	In OEPA VAP leach-based generic soil standards, default range for clay is 2-4 in/yr (5-10 cm/yr). The site-specific range is 0-5 cm/yr. Derivation of values discussed in section 2 and 5.2.3 Value calibrated at high end of site-specific range to result in faster leaching.
Moisture Content (vol%)	22.5	Site-specific range of 19-43%, based on pre-summer/fall 2000 samples. -Site-specific range of 10.3-25.1%, based on summer/fall 2000 samples (possibly somewhat on the low side due to measurement during dry season). Calibration target of 20-25% selected.

Table 5.3 SESOIL Input Parameters for Radiological Characteristics.

Painesville FUSRAP Site; Focused RI/FS Report

	Ra226	Th230	U238	Source/Comment
Solubility	1.00E+10	1.00E+10	1.00E+10	Solubility value acts as a limit on the amount of pollutant that can partition into soil water. In the absence of detailed data on chemical speciation, eH and pH values, an arbitrarily high solubility value was assumed so as not to limit partitioning into soil moisture.
Diffusion Coefficient In Air (cm2/sec)	0	0	0	Assumes no partitioning into the vapor phase in the soil air.
Henry's Constant (m3-atm/mole)	0	0	0	Assumes no partitioning into the vapor phase in the soil air.
Adsorption Coefficient of Organic Carbon, Koc ([ug-poll/g-OC]/[ug-poll/ml-water])	NA	NA	NA	Koc (and foc) not specified for modeling of inorganics. Kd specified instead.
Adsorption Coefficient, Kd ([ug-poll/g-soil]/[ug-poll/ml-water])	1500	4190	27.2	Site-specific range for Ra226 of 1500 to 25100, for Th230 of 4190 to 7900, and for U238 of 27.2 to 391. Low ends of these ranges used, resulting in more pollutant partitioning into soil moisture and therefore more leaching.
Molecular Weight (g/mole)	226	230	238	Speciation unknown, so molecular weight values not known. However, molecular weight is not relevant for any of the transport processes modeled. Molecular weight of isotopes specified.
Specific Activity (pCi/g-isotope)	1.00E+12	2.10E+10	3.40E+05	source: http://www.nrc.gov/NRC/CFR/TABLES/ISOTOPES/PART071/index.html. Sesoil does not directly require specific activity. Specific activity used to convert reported sample concentrations (pCi/g-soil) to appropriate input Sesoil concentrations (ug-contaminant/g-soil).

Note: hydrolysis, biodegradation, complexation processes are not modeled.

Table 5.4 SESOIL Results

Painesville FUSRAP Site; Focused RI/FS Report

	Ra226	Th230	U238	Source/Comment
Modeled time period (years)	1000	1000	1000	
Maximum pollutant depth at time 0 yrs, in cm.	22.5	22.5	22.5	Initial pollutant concentration loaded uniformly into first 30 cm of clay. First 30 cm split into two sublayers in model. SESOIL calculates starting maximum pollutant depth as the middle of the bottom-most sublayer in which pollutant is loaded (bottom-most sublayer is 15-30 cm, with middle at 22.5 cm)
Maximum pollutant depth at time 1000 yrs, in cm.	29	25	313	
Maximum pollutant depth at time 0 yrs., in ft.	0.74	0.74	0.74	
Maximum pollutant concentration at time 1000 yrs. in pCi/g.	1000	300	30	adsorbed Ra226 and Th230 concentrations are the same as source term (1000 pCi/g and 300 pCi/g, respectively) after 1000 years because the modeled Ra226/Th230 have not migrated out of source 'compartment' after 1000 years. Sesoil calculates starting maximum pollutant depth as the middle of the bottom-most sublayer in which pollutant is loaded (in this case, bottom-most sublayer is 15-30 cm, with middle at 22.5 cm). Modeled Ra226 (for example) migrates from 22.5 cm to 29 cm total depth after 1000 years, thus not reaching the bottom of the source compartment (30 cm). At such time (>1000yrs) as the modeled Ra226 reaches the top of the next compartment (30 cm), the concentration in the next compartment would become non-zero, but smaller than the source term (as is the case with U238).

Table 6.1 Identification of Radiological Constituents of Potential Concern
Exposure Unit 1 - Investigative Area A

Medium [a]	CAS Number	Parameter	Minimum Detection	Maximum Detection	Units	Detection Frequency	95% UCL	Value for Comparison [b]	Background [c]	Average Background	EPC [d]	COPC
Soil 0-10 ft	14952-40-0	Actinium-227	0.31	5.08	pCi/g	9/114	0.73	0.73	0.61	0.41	0.32	YES
Soil 0-10 ft	14331-83-0	Actinium-228	0.48	1.8	pCi/g	42/ 44	1.12	1.12	--	--	1.12	NO:3
Soil 0-10 ft	14913-49-6	Bismuth-212	0.51	2.72	pCi/g	20/ 38	0.98	0.98	--	--	0.98	NO:3
Soil 0-10 ft	14733-03-0	Bismuth-214	0.74	963.9	pCi/g	46/ 46	80.3	80.3	--	--	80.3	NO:3
Soil 0-10 ft	14109-32-1	Cadmium-109	41.09	41.09	pCi/g	1/ 3	41.1	41.09	--	--	41.09	NO:2
Soil 0-10 ft	10045-97-3	Cesium-137	0.05	5.67	pCi/g	46/144	0.2	0.2	0.47	0.12	0.08	NO:1
Soil 0-10 ft	10198-40-0	Cobalt-60	0.2	0.38	pCi/g	2/ 38	0.07	0.07	--	--	0.07	NO:2
Soil 0-10 ft	14255-04-0	Lead-210	44	44	pCi/g	1/ 5	28.7	28.7	1.42	0.95	27.75	YES
Soil 0-10 ft	15092-94-1	Lead-212	0.28	32.16	pCi/g	45/ 47	3.98	3.98	--	--	3.98	NO:3
Soil 0-10 ft	15067-28-4	Lead-214	0.77	760.1	pCi/g	44/ 46	70	70	--	--	70	NO:3
Soil 0-10 ft	14269-74-0	Neodymium-147	0.35	2.7	pCi/g	3/ 3	2.7	2.7	--	--	2.7	NO:2
Soil 0-10 ft	13966-00-2	Potassium-40	4.66	30.21	pCi/g	114/114	21.6	21.6	27.6	17.5	4.1	NO:1
Soil 0-10 ft	14331-85-2	Protactinium-231	1.06	1.2	pCi/g	2/113	1.2	1.2	1.82	1.2	--	NO:0
Soil 0-10 ft	15100-28-4	Protactinium-234	8.76	139.4	pCi/g	10/ 38	21.3	21.3	--	--	21.3	NO:3
Soil 0-10 ft	13233-32-4	Radium-224	0.48	2	pCi/g	9/ 9	1.64	1.64	--	--	1.64	NO:3
Soil 0-10 ft	13982-63-3	Radium-226	0.67	862	pCi/g	157/158	27.2	27.2	1.42	0.95	26.25	YES
Soil 0-10 ft	15262-20-1	Radium-228	0.13	1.8	pCi/g	146/152	1.11	1.11	1.41	0.99	0.12	YES*
Soil 0-10 ft	14913-50-9	Thallium-208	0.54	5.37	pCi/g	38/ 38	1.27	1.27	--	--	1.27	NO:3
Soil 0-10 ft	15623-47-9	Thorium-227	0.15	3.65	pCi/g	13/ 23	0.82	0.82	0.81	0.44	0.38	NO:3
Soil 0-10 ft	14274-82-9	Thorium-228	0.13	11.42	pCi/g	147/152	1.7	1.7	1.53	1.13	0.57	YES
Soil 0-10 ft	14269-63-7	Thorium-230	0.65	422	pCi/g	133/152	16.9	16.9	2.56	1.45	15.45	YES
Soil 0-10 ft	7440-29-1	Thorium-232	0.13	9.34	pCi/g	147/152	1.63	1.63	1.53	1.07	0.56	YES
Soil 0-10 ft	15065-10-8	Thorium-234	1.7	214.8	pCi/g	34/ 41	22.9	22.9	--	--	22.9	NO:3
Soil 0-10 ft	13966-29-5	Uranium-234	0.87	294.8	pCi/g	47/ 47	34.6	34.6	2.88	1.29	33.31	YES
Soil 0-10 ft	15117-96-1	Uranium-235	0.11	9.87	pCi/g	104/152	0.88	0.88	0.21	0.14	0.74	YES
Soil 0-10 ft	24678-82-8	Uranium-238	0.65	282.7	pCi/g	82/152	11.6	11.6	2.88	1.29	10.31	YES
Soil 0-2 ft	14952-40-0	Actinium-227	0.35	5.08	pCi/g	5/ 38	1.09	1.09	0.61	0.41	0.68	YES
Soil 0-2 ft	14331-83-0	Actinium-228	0.51	1.8	pCi/g	30/ 31	1.14	1.14	--	--	1.14	NO:3
Soil 0-2 ft	14913-49-6	Bismuth-212	0.53	2.72	pCi/g	14/ 29	1.04	1.04	--	--	1.04	NO:3
Soil 0-2 ft	14733-03-0	Bismuth-214	0.77	963.9	pCi/g	32/ 32	116	116	--	--	116	NO:3
Soil 0-2 ft	14109-32-1	Cadmium-109	41.09	41.09	pCi/g	1/ 3	41.1	41.09	--	--	41.09	NO:2
Soil 0-2 ft	10045-97-3	Cesium-137	0.05	5.67	pCi/g	36/ 64	0.39	0.39	0.47	0.12	0.27	NO:1
Soil 0-2 ft	10198-40-0	Cobalt-60	0.2	0.38	pCi/g	2/ 29	0.08	0.08	--	--	0.08	NO:2
Soil 0-2 ft	14255-04-0	Lead-210	44	44	pCi/g	1/ 3	44	44	1.42	0.95	43.05	YES
Soil 0-2 ft	15092-94-1	Lead-212	0.28	32.16	pCi/g	31/ 33	5.04	5.04	--	--	5.04	NO:3
Soil 0-2 ft	15067-28-4	Lead-214	0.77	760.1	pCi/g	30/ 32	114	114	--	--	114	NO:3
Soil 0-2 ft	14269-74-0	Neodymium-147	2.1	2.7	pCi/g	2/ 2	2.7	2.7	--	--	2.7	NO:2
Soil 0-2 ft	13966-00-2	Potassium-40	4.66	28.01	pCi/g	38/ 38	18.5	18.5	27.6	17.5	1	NO:1
Soil 0-2 ft	15100-28-4	Protactinium-234	8.76	46.62	pCi/g	8/ 29	17.6	17.6	--	--	17.6	NO:3
Soil 0-2 ft	13233-32-4	Radium-224	0.48	1.5	pCi/g	4/ 4	1.5	1.5	--	--	1.5	NO:3
Soil 0-2 ft	13982-63-3	Radium-226	0.67	862	pCi/g	69/ 70	50.6	50.6	1.42	0.95	49.65	YES
Soil 0-2 ft	15262-20-1	Radium-228	0.13	1.8	pCi/g	63/ 67	1.06	1.06	1.41	0.99	0.07	YES*
Soil 0-2 ft	14913-50-9	Thallium-208	0.54	5.37	pCi/g	29/ 29	1.37	1.37	--	--	1.37	NO:3
Soil 0-2 ft	15623-47-9	Thorium-227	0.43	3.65	pCi/g	6/ 10	1.31	1.31	0.81	0.44	0.87	NO:3
Soil 0-2 ft	14274-82-9	Thorium-228	0.13	11.42	pCi/g	62/ 67	2.03	2.03	1.53	1.13	0.9	YES
Soil 0-2 ft	14269-63-7	Thorium-230	1.1	422	pCi/g	60/ 67	34	34	2.56	1.45	32.55	YES
Soil 0-2 ft	7440-29-1	Thorium-232	0.13	9.34	pCi/g	62/ 67	2.09	2.09	1.53	1.07	1.02	YES
Soil 0-2 ft	15065-10-8	Thorium-234	2.13	36.28	pCi/g	27/ 31	14.1	14.1	--	--	14.1	NO:3
Soil 0-2 ft	13966-29-5	Uranium-234	1.37	121.1	pCi/g	33/ 33	43.1	43.1	2.88	1.29	41.81	YES
Soil 0-2 ft	15117-96-1	Uranium-235	0.11	6.4	pCi/g	43/ 67	1.45	1.45	0.21	0.14	1.31	YES
Soil 0-2 ft	24678-82-8	Uranium-238	0.65	80.8	pCi/g	45/ 67	14.4	14.4	2.88	1.29	13.11	YES

a Industrial workers are assumed to be exposed to soil 0-2 feet below land surface. Hypothetical future site residents and subsistence farmers are assumed to be exposed to soil 0-10 feet below land surface.

b Value for comparison defined as the lower of the 95% UCL and the maximum detected concentration.

c Background concentration described using the 95% UTL.

d Average background concentration for each radionuclide was subtracted from the value for comparison to determine the net exposure point concentration (EPC) used in the dose assessment.

NO:1 Value for comparison less than background value

NO:2 Eliminated on basis of weight of evidence. See Section 6.2.3.

NO:3 Short-lived radionuclide, evaluated as part of decay series

YES Constituent of potential concern (COPC).

YES* Retained on basis of weight of evidence. See Section 6.2.3.

Table 6.2 Identification of Radiological Constituents of Potential Concern
Exposure Unit 2 - Investigative Area B

Medium[a]	CAS Number	Parameter	Minimum Detection	Maximum Detection	Units	Detection Frequency	95% UCL	Value for Comparison[b]	Background[c]	Average Background	EPC[d]	COPC
Soil 0-10 ft	14952-40-0	Actinium-227	0.45	1.3	pCi/g	4/ 14	0.73	0.73	0.61	0.41	0.32	YES
Soil 0-10 ft	14331-83-0	Actinium-228	0.64	1.36	pCi/g	3/ 3	1.36	1.36	--	--	1.36	NO:3
Soil 0-10 ft	14913-49-6	Bismuth-212	1.08	1.08	pCi/g	1/ 3	1.08	1.08	--	--	1.08	NO:3
Soil 0-10 ft	14733-03-0	Bismuth-214	1.21	9.64	pCi/g	3/ 3	9.64	9.64	--	--	9.64	NO:3
Soil 0-10 ft	10045-97-3	Cesium-137	0.08	0.56	pCi/g	7/ 15	0.24	0.24	0.47	0.12	0.12	NO:1
Soil 0-10 ft	14255-04-0	Lead-210	1.8	1.8	pCi/g	1/ 1	1.8	1.8	1.42	0.95	0.85	YES
Soil 0-10 ft	15092-94-1	Lead-212	0.63	2.53	pCi/g	2/ 3	2.53	2.53	--	--	2.53	NO:3
Soil 0-10 ft	15067-28-4	Lead-214	1.52	9.85	pCi/g	3/ 3	9.85	9.85	--	--	9.85	NO:3
Soil 0-10 ft	14269-74-0	Neodymium-147	0.38	0.38	pCi/g	1/ 1	0.38	0.38	--	--	0.38	NO:2
Soil 0-10 ft	13966-00-2	Potassium-40	3.4	18.62	pCi/g	14/ 14	14.8	14.8	27.6	17.5	-2.7	NO:1
Soil 0-10 ft	15100-28-4	Protactinium-234	29.46	29.46	pCi/g	1/ 2	29.5	29.46	--	--	29.46	NO:3
Soil 0-10 ft	13233-32-4	Radium-224	0.61	0.61	pCi/g	1/ 1	0.61	0.61	--	--	0.61	NO:3
Soil 0-10 ft	13982-63-3	Radium-226	0.82	10.64	pCi/g	16/ 16	4.75	4.75	1.42	0.95	3.8	YES
Soil 0-10 ft	15262-20-1	Radium-228	0.51	1.36	pCi/g	16/ 16	1.03	1.03	1.41	0.99	0.04	NO:1
Soil 0-10 ft	14913-50-9	Thallium-208	0.5	0.88	pCi/g	2/ 2	0.88	0.88	--	--	0.88	NO:3
Soil 0-10 ft	14274-82-9	Thorium-228	0.51	2.65	pCi/g	16/ 16	1.39	1.39	1.53	1.13	0.26	NO:1
Soil 0-10 ft	14269-63-7	Thorium-230	1.16	10.47	pCi/g	13/ 16	10.5	10.47	2.56	1.45	9.02	YES
Soil 0-10 ft	7440-29-1	Thorium-232	0.51	1.39	pCi/g	16/ 16	1.1	1.1	1.53	1.07	0.03	NO:1
Soil 0-10 ft	15065-10-8	Thorium-234	1.4	4.47	pCi/g	3/ 3	4.47	4.47	--	--	4.47	NO:3
Soil 0-10 ft	13966-29-5	Uranium-234	2.07	8.33	pCi/g	2/ 3	8.33	8.33	2.88	1.29	7.04	YES
Soil 0-10 ft	15117-96-1	Uranium-235	0.13	1.62	pCi/g	13/ 16	0.62	0.62	0.21	0.14	0.48	YES
Soil 0-10 ft	24678-82-8	Uranium-238	1.92	8.35	pCi/g	2/ 16	3.65	3.65	2.88	1.29	2.36	YES
Soil 0-2 ft	14952-40-0	Actinium-227	0.45	1.3	pCi/g	4/ 7	0.92	0.92	0.61	0.41	0.51	YES
Soil 0-2 ft	14331-83-0	Actinium-228	0.64	1.36	pCi/g	3/ 3	1.36	1.36	--	--	1.36	NO:3
Soil 0-2 ft	14913-49-6	Bismuth-212	1.08	1.08	pCi/g	1/ 3	1.08	1.08	--	--	1.08	NO:3
Soil 0-2 ft	14733-03-0	Bismuth-214	1.21	9.64	pCi/g	3/ 3	9.64	9.64	--	--	9.64	NO:3
Soil 0-2 ft	10045-97-3	Cesium-137	0.1	0.56	pCi/g	6/ 8	0.38	0.38	0.47	0.12	0.26	NO:1
Soil 0-2 ft	14255-04-0	Lead-210	1.8	1.8	pCi/g	1/ 1	1.8	1.8	1.42	0.95	0.85	YES
Soil 0-2 ft	15092-94-1	Lead-212	0.63	2.53	pCi/g	2/ 3	2.53	2.53	--	--	2.53	NO:3
Soil 0-2 ft	15067-28-4	Lead-214	1.52	9.85	pCi/g	3/ 3	9.85	9.85	--	--	9.85	NO:3
Soil 0-2 ft	14269-74-0	Neodymium-147	0.38	0.38	pCi/g	1/ 1	0.38	0.38	--	--	0.38	NO:2
Soil 0-2 ft	13966-00-2	Potassium-40	3.4	12.76	pCi/g	7/ 7	10.5	10.5	27.6	17.5	-7	NO:1
Soil 0-2 ft	15100-28-4	Protactinium-234	29.46	29.46	pCi/g	1/ 2	29.5	29.46	--	--	29.46	NO:3
Soil 0-2 ft	13233-32-4	Radium-224	0.61	0.61	pCi/g	1/ 1	0.61	0.61	--	--	0.61	NO:3
Soil 0-2 ft	13982-63-3	Radium-226	0.82	10.64	pCi/g	9/ 9	10.6	10.6	1.42	0.95	9.65	YES
Soil 0-2 ft	15262-20-1	Radium-228	0.51	1.36	pCi/g	9/ 9	1.06	1.06	1.41	0.99	0.07	NO:1
Soil 0-2 ft	14913-50-9	Thallium-208	0.5	0.88	pCi/g	2/ 2	0.88	0.88	--	--	0.88	NO:3
Soil 0-2 ft	14274-82-9	Thorium-228	0.51	2.65	pCi/g	9/ 9	1.72	1.72	1.53	1.13	0.59	NO:2
Soil 0-2 ft	14269-63-7	Thorium-230	2.71	10.47	pCi/g	6/ 9	10.5	10.47	2.56	1.45	9.02	YES
Soil 0-2 ft	7440-29-1	Thorium-232	0.51	1.39	pCi/g	9/ 9	1.14	1.14	1.53	1.07	0.07	NO:1
Soil 0-2 ft	15065-10-8	Thorium-234	1.4	4.47	pCi/g	3/ 3	4.47	4.47	--	--	4.47	NO:3
Soil 0-2 ft	13966-29-5	Uranium-234	2.07	8.33	pCi/g	2/ 3	8.33	8.33	2.88	1.29	7.04	YES
Soil 0-2 ft	15117-96-1	Uranium-235	0.13	1.62	pCi/g	7/ 9	0.94	0.94	0.21	0.14	0.8	YES
Soil 0-2 ft	24678-82-8	Uranium-238	1.92	8.35	pCi/g	2/ 9	4.89	4.89	2.88	1.29	3.6	YES

a Industrial workers are assumed to be exposed to soil 0-2 feet below land surface. Hypothetical future site residents and subsistence farmers are assumed to be exposed to soil 0-10 feet below land surface.

b Value for comparison defined as the lower of the 95% UCL and the maximum detected concentration.

c Background concentration described using the 95% UTL.

d Average background concentration for each radionuclide was subtracted from the value for comparison to determine the net exposure point concentration (EPC) used in the dose assessment.

NO:1 Value for comparison less than background value
NO:2 Eliminated on basis of weight of evidence. See Section 6.2.3.
NO:3 Short-lived radionuclide, evaluated as part of decay series
YES Constituent of potential concern (COPC).

Table 6.3 Identification of Radiological Constituents of Potential Concern
Exposure Unit 3 - Investigative Area C

Medium[a]	CAS Number	Parameter	Minimum Detection	Maximum Detection	Units	Detection Frequency	95% UCL	Value for Comparison[b]	Background[c]	Average Background	EPC[d]	COPC
Soil 0-10 ft	14952-40-0	Actinium-227	0.32	2.13	pCi/g	18/ 44	1.03	1.03	0.61	0.41	0.62	YES
Soil 0-10 ft	14331-83-0	Actinium-228	0.35	2.29	pCi/g	11/ 12	1.75	1.75	--	--	1.75	NO:3
Soil 0-10 ft	14913-49-6	Bismuth-212	0.44	2.57	pCi/g	5/ 9	1.27	1.27	--	--	1.27	NO:3
Soil 0-10 ft	14733-03-0	Bismuth-214	0.72	282.7	pCi/g	15/ 15	283	282.7	--	--	282.7	NO:3
Soil 0-10 ft	14109-32-1	Cadmium-109	9.5	66.1	pCi/g	4/ 5	45.3	45.3	--	--	45.3	NO:2
Soil 0-10 ft	10045-97-3	Cesium-137	0.06	0.68	pCi/g	20/ 47	0.15	0.15	0.47	0.12	0.03	NO:1
Soil 0-10 ft	14391-16-3	Europium-155	1.1	1.8	pCi/g	2/ 2	1.8	1.8	--	--	1.8	NO:2
Soil 0-10 ft	14255-04-0	Lead-210	9.6	54.8	pCi/g	4/ 5	39.5	39.5	1.42	0.95	38.55	YES
Soil 0-10 ft	15092-94-1	Lead-212	0.36	2.56	pCi/g	11/ 14	1.16	1.16	--	--	1.16	NO:3
Soil 0-10 ft	15067-28-4	Lead-214	0.81	71.1	pCi/g	14/ 15	71.1	71.1	--	--	71.1	NO:3
Soil 0-10 ft	14269-74-0	Neodymium-147	1.9	2.8	pCi/g	2/ 5	2.25	2.25	--	--	2.25	NO:2
Soil 0-10 ft	13967-76-5	Niobium-95	1.3	2.8	pCi/g	2/ 3	2.8	2.8	--	--	2.8	NO:2
Soil 0-10 ft	13966-00-2	Potassium-40	2.46	25.22	pCi/g	44/ 44	13.8	13.8	27.6	17.5	-3.7	NO:1
Soil 0-10 ft	14331-85-2	Protactinium-231	1.86	2.17	pCi/g	2/ 44	2.17	2.17	1.82	1.2	0.97	NO:0
Soil 0-10 ft	15100-28-4	Protactinium-234	150.9	150.9	pCi/g	1/ 9	48.4	48.4	--	--	48.4	NO:3
Soil 0-10 ft	13233-32-4	Radium-224	0.35	0.73	pCi/g	4/ 4	0.73	0.73	--	--	0.73	NO:3
Soil 0-10 ft	13982-63-3	Radium-226	0.61	285.05	pCi/g	57/ 57	19.9	19.9	1.42	0.95	18.95	YES
Soil 0-10 ft	15262-20-1	Radium-228	0.2	2.29	pCi/g	48/ 53	0.91	0.91	1.41	0.99	-0.08	NO:1
Soil 0-10 ft	14913-50-9	Thallium-208	0.34	1.82	pCi/g	9/ 9	1.5	1.5	--	--	1.5	NO:3
Soil 0-10 ft	15623-47-9	Thorium-227	1.36	4.53	pCi/g	4/ 6	3.37	3.37	0.81	0.44	2.93	NO:3
Soil 0-10 ft	14274-82-9	Thorium-228	0.27	83.27	pCi/g	48/ 53	6.51	6.51	1.53	1.13	5.38	NO:2
Soil 0-10 ft	14269-63-7	Thorium-230	1.03	311.8	pCi/g	44/ 53	28.3	28.3	2.56	1.45	26.85	YES
Soil 0-10 ft	7440-29-1	Thorium-232	0.27	3	pCi/g	54/ 57	1.23	1.23	1.53	1.07	0.16	NO:1
Soil 0-10 ft	15065-10-8	Thorium-234	1.16	97.02	pCi/g	10/ 14	22.6	22.6	--	--	22.6	NO:3
Soil 0-10 ft	13966-29-5	Uranium-234	1.2	381.8	pCi/g	15/ 15	81.7	81.7	2.88	1.29	80.41	YES
Soil 0-10 ft	15117-96-1	Uranium-235	0.08	42.22	pCi/g	47/ 53	2.91	2.91	0.21	0.14	2.77	YES
Soil 0-10 ft	24678-82-8	Uranium-238	1.34	320.2	pCi/g	29/ 57	21	21	2.88	1.29	19.71	YES
Soil 0-2 ft	14952-40-0	Actinium-227	0.32	2.13	pCi/g	16/ 29	1.48	1.48	0.61	0.41	1.07	YES
Soil 0-2 ft	14331-83-0	Actinium-228	0.35	2.29	pCi/g	9/ 10	2.28	2.28	--	--	2.28	NO:3
Soil 0-2 ft	14913-49-6	Bismuth-212	0.44	2.57	pCi/g	4/ 7	1.53	1.53	--	--	1.53	NO:3
Soil 0-2 ft	14733-03-0	Bismuth-214	0.72	282.7	pCi/g	13/ 13	283	282.7	--	--	282.7	NO:3
Soil 0-2 ft	14109-32-1	Cadmium-109	9.5	66.1	pCi/g	4/ 5	45.3	45.3	--	--	45.3	NO:2
Soil 0-2 ft	10045-97-3	Cesium-137	0.06	0.68	pCi/g	18/ 30	0.2	0.2	0.47	0.12	0.08	NO:1
Soil 0-2 ft	14391-16-3	Europium-155	1.1	1.8	pCi/g	2/ 2	1.8	1.8	--	--	1.8	NO:2
Soil 0-2 ft	14255-04-0	Lead-210	9.6	54.8	pCi/g	4/ 5	39.5	39.5	1.42	0.95	38.55	YES
Soil 0-2 ft	15092-94-1	Lead-212	0.36	2.56	pCi/g	9/ 12	1.14	1.14	--	--	1.14	NO:3
Soil 0-2 ft	15067-28-4	Lead-214	0.81	71.1	pCi/g	12/ 13	71.1	71.1	--	--	71.1	NO:3
Soil 0-2 ft	14269-74-0	Neodymium-147	1.9	2.8	pCi/g	2/ 5	2.25	2.25	--	--	2.25	NO:2
Soil 0-2 ft	13967-76-5	Niobium-95	1.3	2.8	pCi/g	2/ 3	2.8	2.8	--	--	2.8	NO:2
Soil 0-2 ft	13966-00-2	Potassium-40	2.46	17.96	pCi/g	29/ 29	10.6	10.6	27.6	17.5	-6.9	NO:1
Soil 0-2 ft	14331-85-2	Protactinium-231	1.86	2.17	pCi/g	2/ 29	2.17	2.17	1.82	1.2	0.97	NO:3
Soil 0-2 ft	15100-28-4	Protactinium-234	150.9	150.9	pCi/g	1/ 7	64.3	64.3	--	--	64.3	NO:3
Soil 0-2 ft	13233-32-4	Radium-224	0.35	0.73	pCi/g	4/ 4	0.73	0.73	--	--	0.73	NO:3
Soil 0-2 ft	13982-63-3	Radium-226	0.61	285.05	pCi/g	40/ 40	27.6	27.6	1.42	0.95	26.65	YES
Soil 0-2 ft	15262-20-1	Radium-228	0.2	2.29	pCi/g	31/ 36	0.88	0.88	1.41	0.99	-0.11	NO:1
Soil 0-2 ft	14913-50-9	Thallium-208	0.34	1.82	pCi/g	7/ 7	1.23	1.23	--	--	1.23	NO:3
Soil 0-2 ft	15623-47-9	Thorium-227	1.36	4.53	pCi/g	4/ 6	3.37	3.37	0.81	0.44	2.93	NO:3
Soil 0-2 ft	14274-82-9	Thorium-228	0.27	83.27	pCi/g	31/ 36	9	9	1.53	1.13	7.87	NO:2
Soil 0-2 ft	14269-63-7	Thorium-230	1.03	311.8	pCi/g	29/ 36	41	41	2.56	1.45	39.55	YES
Soil 0-2 ft	7440-29-1	Thorium-232	0.27	3	pCi/g	37/ 40	1.27	1.27	1.53	1.07	0.2	NO:1
Soil 0-2 ft	15065-10-8	Thorium-234	1.16	97.02	pCi/g	9/ 12	26.2	26.2	--	--	26.2	NO:3
Soil 0-2 ft	13966-29-5	Uranium-234	1.2	381.8	pCi/g	13/ 13	364	364	2.88	1.29	362.71	YES
Soil 0-2 ft	15117-96-1	Uranium-235	0.08	42.22	pCi/g	32/ 36	3.38	3.38	0.21	0.14	3.24	YES
Soil 0-2 ft	24678-82-8	Uranium-238	1.56	320.2	pCi/g	24/ 40	29	29	2.88	1.29	27.71	YES

a Industrial workers are assumed to be exposed to soil 0-2 feet below land surface. Hypothetical future site residents and subsistence farmers are assumed to be exposed to soil 0-10 feet below land surface.

b Value for comparison defined as the lower of the 95% UCL and the maximum detected concentration.

c Background concentration described using the 95% UTL.

d Average background concentration for each radionuclide was subtracted from the value for comparison to determine the net exposure point concentration (EPC) used in the dose assessment

NO:1 Value for comparison less than background value

NO:2 Eliminated on basis of weight of evidence. See Section 6.2.3.

NO:3 Short-lived radionuclide, evaluated as part of decay series

YES Constituent of potential concern (COPC).

Table 6.4 Identification of Radiological Constituents of Potential Concern
Exposure Unit 4 - Investigative Area D

Medium[a]	CAS Number	Parameter	Minimum Detection	Maximum Detection	Units	Detection Frequency	95% UCL	Value for Comparison[b]	Background[d]	Average Background	EPC[d]	COPC
Soil 0-10 ft	14952-40-0	Actinium-227	0.33	0.56	pCi/g	4/ 16	0.46	0.46	0.61	0.41	0.05	NO:1
Soil 0-10 ft	14331-83-0	Actinium-228	0.57	1.22	pCi/g	4/ 4	1.18	1.18	--	--	1.18	NO:3
Soil 0-10 ft	14913-49-6	Bismuth-212	0.76	1.27	pCi/g	3/ 4	1.27	1.27	--	--	1.27	NO:3
Soil 0-10 ft	14733-03-0	Bismuth-214	2.67	14.85	pCi/g	4/ 4	14.9	14.85	--	--	14.85	NO:3
Soil 0-10 ft	10045-97-3	Cesium-137	0.05	0.73	pCi/g	11/ 20	0.22	0.22	0.47	0.12	0.1	NO:1
Soil 0-10 ft	15092-94-1	Lead-212	0.35	1.44	pCi/g	3/ 4	1.44	1.44	--	--	1.44	NO:3
Soil 0-10 ft	15067-28-4	Lead-214	2.94	14.66	pCi/g	4/ 4	14.7	14.66	--	--	14.66	NO:3
Soil 0-10 ft	13966-00-2	Potassium-40	4.62	16.81	pCi/g	16/ 16	11.5	11.5	27.6	17.5	-6	NO:1
Soil 0-10 ft	13982-63-3	Radium-226	0.38	14.76	pCi/g	20/ 20	8.57	8.57	1.42	0.95	7.62	YES
Soil 0-10 ft	15262-20-1	Radium-228	0.3	1.22	pCi/g	20/ 20	0.8	0.8	1.41	0.99	-0.19	NO:1
Soil 0-10 ft	14913-50-9	Thallium-208	0.59	0.94	pCi/g	4/ 4	0.94	0.94	--	--	0.94	NO:3
Soil 0-10 ft	14274-82-9	Thorium-228	0.48	3.03	pCi/g	20/ 20	1.38	1.38	1.53	1.13	0.25	NO:1
Soil 0-10 ft	14269-63-7	Thorium-230	1.58	20.7	pCi/g	16/ 20	11.3	11.3	2.56	1.45	9.85	YES
Soil 0-10 ft	7440-29-1	Thorium-232	0.36	2.58	pCi/g	20/ 20	1.36	1.36	1.53	1.07	0.29	NO:1
Soil 0-10 ft	15065-10-8	Thorium-234	2.15	2.15	pCi/g	1/ 4	2.15	2.15	--	--	2.15	NO:3
Soil 0-10 ft	13966-29-5	Uranium-234	2.33	5.53	pCi/g	4/ 4	5.21	5.21	2.88	1.29	3.92	YES
Soil 0-10 ft	15117-96-1	Uranium-235	0.09	0.83	pCi/g	16/ 20	0.4	0.4	0.21	0.14	0.26	YES
Soil 0-10 ft	24678-82-8	Uranium-238	2.13	5.32	pCi/g	7/ 20	2.94	2.94	2.88	1.29	1.65	YES
Soil 0-2 ft	14952-40-0	Actinium-227	0.33	0.56	pCi/g	4/ 11	0.46	0.46	0.61	0.41	0.05	NO:1
Soil 0-2 ft	14331-83-0	Actinium-228	0.57	1.22	pCi/g	4/ 4	1.18	1.18	--	--	1.18	NO:3
Soil 0-2 ft	14913-49-6	Bismuth-212	0.76	1.27	pCi/g	3/ 4	1.27	1.27	--	--	1.27	NO:3
Soil 0-2 ft	14733-03-0	Bismuth-214	2.67	14.85	pCi/g	4/ 4	14.9	14.85	--	--	14.85	NO:3
Soil 0-2 ft	10045-97-3	Cesium-137	0.05	0.73	pCi/g	11/ 15	0.37	0.37	0.47	0.12	0.25	NO:1
Soil 0-2 ft	15092-94-1	Lead-212	0.35	1.44	pCi/g	3/ 4	1.44	1.44	--	--	1.44	NO:3
Soil 0-2 ft	15067-28-4	Lead-214	2.94	14.66	pCi/g	4/ 4	14.7	14.66	--	--	14.66	NO:3
Soil 0-2 ft	13966-00-2	Potassium-40	4.62	12.28	pCi/g	11/ 11	10.3	10.3	27.6	17.5	-7.2	NO:1
Soil 0-2 ft	13982-63-3	Radium-226	0.38	14.76	pCi/g	15/ 15	12.7	12.7	1.42	0.95	11.75	YES
Soil 0-2 ft	15262-20-1	Radium-228	0.3	1.22	pCi/g	15/ 15	0.79	0.79	1.41	0.99	-0.2	YES*
Soil 0-2 ft	14913-50-9	Thallium-208	0.59	0.94	pCi/g	4/ 4	0.94	0.94	--	--	0.94	NO:3
Soil 0-2 ft	14274-82-9	Thorium-228	0.48	3.03	pCi/g	15/ 15	1.61	1.61	1.53	1.13	0.48	YES
Soil 0-2 ft	14269-63-7	Thorium-230	1.68	20.7	pCi/g	13/ 15	18.3	18.3	2.56	1.45	16.85	YES
Soil 0-2 ft	7440-29-1	Thorium-232	0.36	2.58	pCi/g	15/ 15	1.55	1.55	1.53	1.07	0.48	YES
Soil 0-2 ft	15065-10-8	Thorium-234	2.15	2.15	pCi/g	1/ 4	2.15	2.15	--	--	2.15	NO:3
Soil 0-2 ft	13966-29-5	Uranium-234	2.33	5.53	pCi/g	4/ 4	5.21	5.21	2.88	1.29	3.92	YES
Soil 0-2 ft	15117-96-1	Uranium-235	0.1	0.83	pCi/g	12/ 15	0.6	0.6	0.21	0.14	0.46	YES
Soil 0-2 ft	24678-82-8	Uranium-238	2.13	5.32	pCi/g	7/ 15	3.42	3.42	2.88	1.29	2.13	YES

a Industrial workers are assumed to be exposed to soil 0-2 feet below land surface. Hypothetical future site residents and subsistence farmers are assumed to be exposed to soil 0-10 feet below land surface.
b Value for comparison defined as the lower of the 95% UCL and the maximum detected concentration.
c Background concentration described using the 95% UTL.
d Average background concentration for each radionuclide was subtracted from the value for comparison to determine the net exposure point concentration (EPC) used in the dose assessment.

NO:1 Value for comparison less than background value
NO:2 Eliminated on basis of weight of evidence. See Section 6.2.3.
NO:3 Short-lived radionuclide, evaluated as part of decay series
YES Constituent of potential concern (COPC).
YES* Retained on basis of weight of evidence. See Section 6.2.3.

Table 6.5 Identification of Radiolo Constituents of Potential Concern
Exposure Unit 5 stigative Area G

Medium[a]	CAS Number	Parameter	Minimum Detection	Maximum Detection	Units	Detection Frequency	95% UCL	Value for Comparison[b]	Background[c]	Average Background	EPC[d]	COPC
Soil 0-10 ft	**14952-40-0**	**Actinium-227**	**0.23**	**1.98**	**pCi/g**	**3/ 15**	**0.73**	**0.73**	**0.61**	**0.41**	**0.32**	**YES**
Soil 0-10 ft	14331-83-0	Actinium-228	0 77	1.32	pCi/g	2/ 2	1.32	1.32	--	--	1.32	NO:3
Soil 0-10 ft	14913-49-6	Bismuth-212	0.77	0.77	pCi/g	1/ 1	0.77	0.77	--	--	0.77	NO:3
Soil 0-10 ft	14733-03-0	Bismuth-214	2 11	2.2	pCi/g	2/ 2	2.2	2.2	--	--	2.2	NO:3
Soil 0-10 ft	10045-97-3	Cesium-137	0.05	0.37	pCi/g	6/ 15	0.15	0.15	0.47	0.12	0.03	NO:1
Soil 0-10 ft	14255-04-0	Lead-210	1.2	1.2	pCi/g	1/ 1	1.2	1.2	1.42	0.95	0.25	NO:1
Soil 0-10 ft	15092-94-1	Lead-212	0.6	2.92	pCi/g	2/ 2	2.92	2.92	--	--	2.92	NO:3
Soil 0-10 ft	15067-28-4	Lead-214	2 19	2.2	pCi/g	2/ 2	2.2	2.2	--	--	2.2	NO:3
Soil 0-10 ft	14269-74-0	Neodymium-147	0.73	0.73	pCi/g	1/ 1	0.73	0.73	--	--	0.73	NO:2
Soil 0-10 ft	13966-00-2	Potassium-40	2.98	24.15	pCi/g	15/ 15	16.8	16.8	27.6	17.5	-0.7	NO:1
Soil 0-10 ft	13233-32-4	Radium-224	0 59	0.59	pCi/g	1/ 1	0.59	0.59	--	--	0.59	NO:3
Soil 0-10 ft	**13982-63-3**	**Radium-226**	**0.49**	**22.4**	**pCi/g**	**16/ 16**	**5.5**	**5.5**	**1.42**	**0.95**	**4.55**	**YES**
Soil 0-10 ft	15262-20-1	Radium-228	0 47	1.32	pCi/g	16/ 16	1.1	1.1	1.41	0.99	0.11	NO:1
Soil 0-10 ft	14913-50-9	Thallium-208	1 09	1.09	pCi/g	1/ 1	1.09	1.09	--	--	1.09	NO:3
Soil 0-10 ft	15623-47-9	Thorium-227	0.19	0.19	pCi/g	1/ 1	0.19	0.19	0.81	0.44	-0.25	NO:3
Soil 0-10 ft	14274-82-9	Thorium-228	0.57	5.29	pCi/g	16/ 16	1.8	1.8	1.53	1.13	0.67	NO:2
Soil 0-10 ft	**14269-63-7**	**Thorium-230**	**0.97**	**13.5**	**pCi/g**	**15/ 16**	**10.3**	**10.3**	**2.56**	**1.45**	**8.85**	**YES**
Soil 0-10 ft	7440-29-1	Thorium-232	0.39	2.35	pCi/g	16/ 16	1.36	1.36	1.53	1.07	0.29	NO:1
Soil 0-10 ft	15065-10-8	Thorium-234	1.36	1.36	pCi/g	1/ 2	1.36	1.36	--	--	1.36	NO:3
Soil 0-10 ft	**13966-29-5**	**Uranium-234**	**2.67**	**3.71**	**pCi/g**	**2/ 2**	**3.71**	**3.71**	**2.88**	**1.29**	**2.42**	**YES**
Soil 0-10 ft	**15117-96-1**	**Uranium-235**	**0.15**	**2.21**	**pCi/g**	**11/ 16**	**0.63**	**0.63**	**0.21**	**0.14**	**0.49**	**YES**
Soil 0-10 ft	**24678-82-8**	**Uranium-238**	**2**	**12.12**	**pCi/g**	**6/ 16**	**4.61**	**4.61**	**2.88**	**1.29**	**3.32**	**YES**
Soil 0-2 ft	**14952-40-0**	**Actinium-227**	**0.58**	**1.98**	**pCi/g**	**2/ 9**	**0.95**	**0.95**	**0.61**	**0.41**	**0.54**	**YES**
Soil 0-2 ft	14331-83-0	Actinium-228	0.77	1.32	pCi/g	2/ 2	1.32	1.32	--	--	1.32	NO:3
Soil 0-2 ft	14913-49-6	Bismuth-212	0.77	0.77	pCi/g	1/ 1	0.77	0.77	--	--	0.77	NO:3
Soil 0-2 ft	14733-03-0	Bismuth-214	2 11	2.2	pCi/g	2/ 2	2.2	2.2	--	--	2.2	NO:3
Soil 0-2 ft	10045-97-3	Cesium-137	0.05	0.37	pCi/g	6/ 9	0.22	0.22	0.47	0.12	0.1	NO:1
Soil 0-2 ft	14255-04-0	Lead-210	1.2	1.2	pCi/g	1/ 1	1.2	1.2	1.42	0.95	0.25	NO:1
Soil 0-2 ft	15092-94-1	Lead-212	0.6	2.92	pCi/g	2/ 2	2.92	2.92	--	--	2.92	NO:3
Soil 0-2 ft	15067-28-4	Lead-214	2 19	2.2	pCi/g	2/ 2	2.2	2.2	--	--	2.2	NO:3
Soil 0-2 ft	14269-74-0	Neodymium-147	0.73	0.73	pCi/g	1/ 1	0.73	0.73	--	--	0.73	NO:2
Soil 0-2 ft	13966-00-2	Potassium-40	2.98	18.88	pCi/g	9/ 9	15.4	15.4	27.6	17.5	-2.1	NO:1
Soil 0-2 ft	13233-32-4	Radium-224	0.59	0.59	pCi/g	1/ 1	0.59	0.59	--	--	0.59	NO:3
Soil 0-2 ft	**13982-63-3**	**Radium-226**	**0.49**	**22.4**	**pCi/g**	**10/ 10**	**15**	**15**	**1.42**	**0.95**	**14.05**	**YES**
Soil 0-2 ft	**15262-20-1**	**Radium-228**	**0.47**	**1.32**	**pCi/g**	**10/ 10**	**1.13**	**1.13**	**1.41**	**0.99**	**0.14**	**YES***
Soil 0-2 ft	14913-50-9	Thallium-208	1.09	1.09	pCi/g	1/ 1	1.09	1.09	--	--	1.09	NO:3
Soil 0-2 ft	15623-47-9	Thorium-227	0.19	0 19	pCi/g	1/ 1	0.19	0.19	0.81	0.44	-0.25	NO:3
Soil 0-2 ft	**14274-82-9**	**Thorium-228**	**0.57**	**5.29**	**pCi/g**	**10/ 10**	**2.23**	**2.23**	**1.53**	**1.13**	**1.1**	**YES**
Soil 0-2 ft	**14269-63-7**	**Thorium-230**	**1**	**13.5**	**pCi/g**	**9/ 10**	**13.5**	**13.5**	**2.56**	**1.45**	**12.05**	**YES**
Soil 0-2 ft	**7440-29-1**	**Thorium-232**	**0.39**	**2.35**	**pCi/g**	**10/ 10**	**1.69**	**1.69**	**1.53**	**1.07**	**0.62**	**YES**
Soil 0-2 ft	15065-10-8	Thorium-234	1.36	1.36	pCi/g	1/ 2	1.36	1.36	--	--	1.36	NO:3
Soil 0-2 ft	**13966-29-5**	**Uranium-234**	**2.67**	**3.71**	**pCi/g**	**2/ 2**	**3.71**	**3.71**	**2.88**	**1.29**	**2.42**	**YES**
Soil 0-2 ft	**15117-96-1**	**Uranium-235**	**0.15**	**2.21**	**pCi/g**	**7/ 10**	**0.92**	**0.92**	**0.21**	**0.14**	**0.78**	**YES**
Soil 0-2 ft	**24678-82-8**	**Uranium-238**	**2**	**12.12**	**pCi/g**	**6/ 10**	**6.26**	**6.26**	**2.88**	**1.29**	**4.97**	**YES**

a Industrial workers are assumed to be exposed to soil 0-2 feet below land surface. Hypothetical future site residents and subsistence farmers are assumed to be exposed to soil 0-10 feet below land surface.
b Value for comparison defined as the lower of the 95% UCL and the maximum detected concentration.
c Background concentration described using the 95% UTL.
d Average background concentration for each radionuclide was subtracted from the value for comparison to determine the net exposure point concentration (EPC) used in the dose assessment.

NO:1 Value for comparison less than background value
NO:2 Eliminated on basis of weight of evidence. See Section 6.2.3.
NO:3 Short-lived radionuclide, evaluated as part of decay series
YES Constituent of potential concern (COPC).
YES* Retained on basis of weight of evidence. See Section 6.2.3.

Table 6.6 Identification of Radiolo Constituents of Potential Concern
Exposure Unit 6 estigative Area I

Medium[a]	CAS Number	Parameter	Minimum Detection	Maximum Detection	Units	Detection Frequency	95% UCL	Value for Comparison[b]	Background[c]	Average Background	EPC[d]	COPC
Soil 0-10 ft	**14952-40-0**	**Actinium-227**	**0.28**	**2.91**	**pCi/g**	**3/ 9**	**2.46**	**2.46**	**0.61**	**0.41**	**2.05**	**YES**
Soil 0-10 ft	14596-10-2	Americium-241	0.47	0.47	pCi/g	1/ 9	0.47	0.47	0.25	0.15	0.32	NO:2
Soil 0-10 ft	14733-03-0	Bismuth-214	125.11	125.11	pCi/g	1/ 1	125	125	--	--	125	NO:3
Soil 0-10 ft	14109-32-1	Cadmium-109	100.7	100.7	pCi/g	1/ 2	101	100.7	--	--	100.7	NO:2
Soil 0-10 ft	10045-97-3	Cesium-137	0.06	0.25	pCi/g	3/ 7	0.15	0.15	0.47	0.12	0.03	NO:1
Soil 0-10 ft	14391-16-3	Europium-155	7.1	7.1	pCi/g	1/ 1	7.1	7.1	--	--	7.1	NO:2
Soil 0-10 ft	**14255-04-0**	**Lead-210**	**74**	**76.86**	**pCi/g**	**2/ 2**	**76.9**	**76.86**	**1.42**	**0.95**	**75.91**	**YES**
Soil 0-10 ft	15067-28-4	Lead-214	125.11	125.11	pCi/g	1/ 1	125	125	--	--	125	NO:3
Soil 0-10 ft	14269-74-0	Neodymium-147	3.5	6.19	pCi/g	2/ 2	6.19	6.19	--	--	6.19	NO:2
Soil 0-10 ft	13967-76-5	Niobium-95	11.19	11.19	pCi/g	1/ 1	11.2	11.19	--	--	11.19	NO:2
Soil 0-10 ft	13967-76-5(M)	Niobium-95m	7.3	7.3	pCi/g	1/ 1	7.3	7.3	--	--	7.3	NO:2
Soil 0-10 ft	13966-00-2	Potassium-40	4.82	25.32	pCi/g	9/ 9	18.5	18.5	27.6	17.5	1	NO:1
Soil 0-10 ft	**13982-63-3**	**Radium-226**	**1.06**	**125.11**	**pCi/g**	**9/ 9**	**125**	**125**	**1.42**	**0.95**	**124.05**	**YES**
Soil 0-10 ft	**15262-20-1**	**Radium-228**	**0.43**	**1.18**	**pCi/g**	**7/ 9**	**1.18**	**1.18**	**1.41**	**0.99**	**0.19**	**YES***
Soil 0-10 ft	15623-47-9	Thorium-227	6.04	6.99	pCi/g	2/ 2	6.99	6.99	0.81	0.44	6.55	NO:3
Soil 0-10 ft	**14274-82-9**	**Thorium-228**	**0.43**	**2.18**	**pCi/g**	**9/ 9**	**1.55**	**1.55**	**1.53**	**1.13**	**0.42**	**YES**
Soil 0-10 ft	**14269-63-7**	**Thorium-230**	**1.54**	**304.2**	**pCi/g**	**6/ 9**	**102**	**102**	**2.56**	**1.45**	**100.55**	**YES**
Soil 0-10 ft	**7440-29-1**	**Thorium-232**	**0.43**	**2.11**	**pCi/g**	**9/ 9**	**2.05**	**2.05**	**1.53**	**1.07**	**0.98**	**YES**
Soil 0-10 ft	15065-10-8	Thorium-234	22.2	25.38	pCi/g	2/ 2	25.4	25.38	--	--	25.38	NO:3
Soil 0-10 ft	**13966-29-5**	**Uranium-234**	**20.47**	**43.93**	**pCi/g**	**2/ 2**	**43.9**	**43.9**	**2.88**	**1.29**	**42.61**	**YES**
Soil 0-10 ft	**15117-96-1**	**Uranium-235**	**0.14**	**4.73**	**pCi/g**	**9/ 9**	**4.73**	**4.73**	**0.21**	**0.14**	**4.59**	**YES**
Soil 0-10 ft	**24678-82-8**	**Uranium-238**	**6.25**	**44.56**	**pCi/g**	**6/ 9**	**19.9**	**19.9**	**2.88**	**1.29**	**18.61**	**YES**
Soil 0-2 ft	**14952-40-0**	**Actinium-227**	**2.91**	**2.91**	**pCi/g**	**1/ 5**	**2.91**	**2.91**	**0.61**	**0.41**	**2.5**	**YES**
Soil 0-2 ft	14596-10-2	Americium-241	0.47	0.47	pCi/g	1/ 5	0.47	0.47	0.25	0.15	0.32	NO:2
Soil 0-2 ft	14733-03-0	Bismuth-214	125.11	125.11	pCi/g	1/ 1	125	125	--	--	125	NO:3
Soil 0-2 ft	14109-32-1	Cadmium-109	100.7	100.7	pCi/g	1/ 2	101	100.7	--	--	100.7	NO:2
Soil 0-2 ft	10045-97-3	Cesium-137	0.14	0.25	pCi/g	2/ 3	0.25	0.25	0.47	0.12	0.13	NO:1
Soil 0-2 ft	14391-16-3	Europium-155	7.1	7.1	pCi/g	1/ 1	7.1	7.1	--	--	7.1	NO:2
Soil 0-2 ft	**14255-04-0**	**Lead-210**	**74**	**76.86**	**pCi/g**	**2/ 2**	**76.9**	**76.86**	**1.42**	**0.95**	**75.91**	**YES**
Soil 0-2 ft	15067-28-4	Lead-214	125.11	125.11	pCi/g	1/ 1	125	125	--	--	125	NO:3
Soil 0-2 ft	14269-74-0	Neodymium-147	3.5	6.19	pCi/g	2/ 2	6.19	6.19	--	--	6.19	NO:2
Soil 0-2 ft	13967-76-5	Niobium-95	11.19	11.19	pCi/g	1/ 1	11.2	11.19	--	--	11.19	NO:2
Soil 0-2 ft	13967-76-5(M)	Niobium-95m	7.3	7.3	pCi/g	1/ 1	7.3	7.3	--	--	7.3	NO:2
Soil 0-2 ft	13966-00-2	Potassium-40	12.46	25.32	pCi/g	5/ 5	23	23	27.6	17.5	5.5	NO:1
Soil 0-2 ft	**13982-63-3**	**Radium-226**	**1.06**	**125.11**	**pCi/g**	**5/ 5**	**88.5**	**88.5**	**1.42**	**0.95**	**87.55**	**YES**
Soil 0-2 ft	**15262-20-1**	**Radium-228**	**1.02**	**1.18**	**pCi/g**	**3/ 5**	**1.18**	**1.18**	**1.41**	**0.99**	**0.19**	**YES***
Soil 0-2 ft	15623-47-9	Thorium-227	6.04	6.99	pCi/g	2/ 2	6.99	6.99	0.81	0.44	6.55	NO:3
Soil 0-2 ft	**14274-82-9**	**Thorium-228**	**1.02**	**2.18**	**pCi/g**	**5/ 5**	**1.94**	**1.94**	**1.53**	**1.13**	**0.81**	**YES**
Soil 0-2 ft	**14269-63-7**	**Thorium-230**	**1.54**	**304.2**	**pCi/g**	**4/ 5**	**196**	**196**	**2.56**	**1.45**	**194.55**	**YES**
Soil 0-2 ft	**7440-29-1**	**Thorium-232**	**0.99**	**2.11**	**pCi/g**	**5/ 5**	**2.04**	**2.04**	**1.53**	**1.07**	**0.97**	**YES**
Soil 0-2 ft	15065-10-8	Thorium-234	22.2	25.38	pCi/g	2/ 2	25.4	25.38	--	--	25.38	NO:3
Soil 0-2 ft	**13966-29-5**	**Uranium-234**	**20.47**	**43.93**	**pCi/g**	**2/ 2**	**43.9**	**43.9**	**2.88**	**1.29**	**42.61**	**YES**
Soil 0-2 ft	**15117-96-1**	**Uranium-235**	**0.14**	**4.73**	**pCi/g**	**5/ 5**	**3.97**	**3.97**	**0.21**	**0.14**	**3.83**	**YES**
Soil 0-2 ft	**24678-82-8**	**Uranium-238**	**13.18**	**44.56**	**pCi/g**	**3/ 5**	**32.7**	**32.7**	**2.88**	**1.29**	**31.41**	**YES**

a Industrial workers are assumed to be exposed to soil 0-2 feet below land surface. Hypothetical future site residents and subsistence farmers are assumed to be exposed to soil 0-10 feet below land surface.
b Value for comparison defined as the lower of the 95% UCL and the maximum detected concentration.
c Background concentration described using the 95% UTL.
d Average background concentration for each radionuclide was subtracted from the value for comparison to determine the net exposure point concentration (EPC) used in the dose assessment.

NO:1 Value for comparison less than background value
NO:2 Eliminated on basis of weight of evidence. See Section 6.2.3.
NO:3 Short-lived radionuclide, evaluated as part of decay series
YES Constituent of potential concern (COPC).
YES* Retained on basis of weight of evidence. See Section 6.2.3.

Table 6.7 Identification of Radiological Constituents of Potential Concern
Exposure Unit 7 - Post-1950 Structures

Medium [a]	CAS Number	Parameter	Minimum Detection	Maximum Detection	Units	Detection Frequency	95% UCL	Value for Comparison [b]	Background [c]	Average Background	EPC [d]	COPC
Soil 0-10 ft	14331-83-0	Actinium-228	0.7	2.21	pCi/g	16/ 16	1.21	1.21	--	--	1.21	NO:3
Soil 0-10 ft	14913-49-6	Bismuth-212	0.52	1.53	pCi/g	12/ 16	0.87	0.87	--	--	0.87	NO:3
Soil 0-10 ft	14733-03-0	Bismuth-214	0.67	7.07	pCi/g	16/ 16	2.11	2.11	--	--	2.11	NO:3
Soil 0-10 ft	10045-97-3	Cesium-137	0.04	0.26	pCi/g	4/ 16	0.09	0.09	0.47	0.12	-0.03	NO:1
Soil 0-10 ft	15092-94-1	Lead-212	0.81	2.31	pCi/g	10/ 16	1.36	1.36	--	--	1.36	NO:3
Soil 0-10 ft	15067-28-4	Lead-214	0.58	7.78	pCi/g	10/ 16	2.24	2.24	--	--	2.24	NO:3
Soil 0-10 ft	13966-00-2	Potassium-40	11.43	25.3	pCi/g	15/ 15	16.9	16.9	27.6	17.5	-0.6	NO:1
Soil 0-10 ft	**13982-63-3**	**Radium-226**	**0.69**	**7.42**	**pCi/g**	**16/ 16**	**2.17**	**2.17**	**1.42**	**0.95**	**1.22**	**YES**
Soil 0-10 ft	15262-20-1	Radium-228	0.7	2.21	pCi/g	16/ 16	1.21	1.21	1.41	0.99	0.22	NO:1
Soil 0-10 ft	14913-50-9	Thallium-208	0.49	1.43	pCi/g	16/ 16	1.01	1.01	--	--	1.01	NO:3
Soil 0-10 ft	14274-82-9	Thorium-228	0.61	1.57	pCi/g	16/ 16	1.09	1.09	1.53	1.13	-0.04	NO:1
Soil 0-10 ft	14269-63-7	Thorium-230	1.03	3.73	pCi/g	16/ 16	1.78	1.78	2.56	1.45	0.33	NO:1
Soil 0-10 ft	7440-29-1	Thorium-232	0.66	1.21	pCi/g	16/ 16	1.03	1.03	1.53	1.07	-0.04	NO:1
Soil 0-10 ft	15065-10-8	Thorium-234	1.13	5.6	pCi/g	13/ 16	2.67	2.67	--	--	2.67	NO:3
Soil 0-10 ft	13966-29-5	Uranium-234	1.04	3.5	pCi/g	16/ 16	1.78	1.78	2.88	1.29	0.49	NO:1
Soil 0-10 ft	15117-96-1	Uranium-235	0.16	0.18	pCi/g	3/ 16	0.12	0.12	0.21	0.14	-0.02	NO:1
Soil 0-10 ft	24678-82-8	Uranium-238	0.95	2.99	pCi/g	16/ 16	1.81	1.81	2.88	1.29	0.52	NO:1
Soil 0-2 ft	14331-83-0	Actinium-228	0.7	1.48	pCi/g	8/ 8	1.24	1.24	--	--	1.24	NO:3
Soil 0-2 ft	14913-49-6	Bismuth-212	0.52	0.82	pCi/g	5/ 8	0.81	0.81	--	--	0.81	NO:3
Soil 0-2 ft	14733-03-0	Bismuth-214	0.67	1.97	pCi/g	8/ 8	1.36	1.36	--	--	1.36	NO:3
Soil 0-2 ft	10045-97-3	Cesium-137	0.04	0.07	pCi/g	2/ 8	0.07	0.07	0.47	0.12	-0.05	NO:1
Soil 0-2 ft	15092-94-1	Lead-212	0.81	1.56	pCi/g	6/ 8	1.23	1.23	--	--	1.23	NO:3
Soil 0-2 ft	15067-28-4	Lead-214	0.58	2.03	pCi/g	6/ 8	1.34	1.34	--	--	1.34	NO:3
Soil 0-2 ft	13966-00-2	Potassium-40	11.43	25.3	pCi/g	8/ 8	19.3	19.3	27.6	17.5	1.8	NO:1
Soil 0-2 ft	13982-63-3	Radium-226	0.69	2	pCi/g	8/ 8	1.39	1.39	1.42	0.95	0.44	NO:1
Soil 0-2 ft	15262-20-1	Radium-228	0.7	1.48	pCi/g	8/ 8	1.24	1.24	1.41	0.99	0.25	NO:1
Soil 0-2 ft	14913-50-9	Thallium-208	0.49	1.2	pCi/g	8/ 8	0.98	0.98	--	--	0.98	NO:3
Soil 0-2 ft	14274-82-9	Thorium-228	0.61	1.57	pCi/g	8/ 8	1.22	1.22	1.53	1.13	0.09	NO:1
Soil 0-2 ft	14269-63-7	Thorium-230	1.09	1.57	pCi/g	8/ 8	1.48	1.48	2.56	1.45	0.03	NO:1
Soil 0-2 ft	7440-29-1	Thorium-232	0.72	1.19	pCi/g	8/ 8	1.06	1.06	1.53	1.07	-0.01	NO:1
Soil 0-2 ft	15065-10-8	Thorium-234	1.13	3.91	pCi/g	7/ 8	2.94	2.94	--	--	2.94	NO:3
Soil 0-2 ft	13966-29-5	Uranium-234	1.04	1.62	pCi/g	8/ 8	1.43	1.43	2.88	1.29	0.14	NO:1
Soil 0-2 ft	15117-96-1	Uranium-235	0.16	0.17	pCi/g	2/ 8	0.13	0.13	0.21	0.14	-0.01	NO:1
Soil 0-2 ft	24678-82-8	Uranium-238	0.95	1.61	pCi/g	8/ 8	1.48	1.48	2.88	1.29	0.19	NO:1

a Industrial workers are assumed to be exposed to soil 0-2 feet below land surface. Hypothetical future site residents and subsistence farmers are assumed to be exposed to soil 0-10 feet below land surface.

b Value for comparison defined as the lower of the 95% UCL and the maximum detected concentration.

c Background concentration described using the 95% UTL.

d Average background concentration for each radionuclide was subtracted from the value for comparison to determine the net exposure point concentration (EPC) used in the dose assessment.

NO:1 Value for comparison less than background value
NO:2 Eliminated on basis of weight of evidence. See Section 6.2.3.
NO:3 Short-lived radionuclide, evaluated as part of decay series
YES Constituent of potential concern (COPC).

Table 6.8 Identification of Radiological Constituents of Potential Concern
Exposure Unit 8 - Rubble Pile

Medium[a]	CAS Number	Parameter	Minimum Detection	Maximum Detection	Units	Detection Frequency	95% UCL	Value for Comparison[b]	Background[c]	Average Background	EPC[d]	COPC
Soil 0-10 ft	14331-83-0	Actinium-228	0.46	1.46	pCi/g	12/ 13	1.08	1.08	--	--	1.08	NO:3
Soil 0-10 ft	14913-49-6	Bismuth-212	0.51	1.67	pCi/g	9/ 13	1.02	1.02	--	--	1.02	NO:3
Soil 0-10 ft	14733-03-0	Bismuth-214	0.69	75.94	pCi/g	13/ 13	21.7	21.7	--	--	21.7	NO:3
Soil 0-10 ft	10045-97-3	Cesium-137	0.08	0.28	pCi/g	5/ 19	0.1	0.1	0.47	0.12	-0.02	NO:1
Soil 0-10 ft	10198-40-0	Cobalt-60	0.14	0.14	pCi/g	1/ 13	0.04	0.04	--	--	0.04	NO:2
Soil 0-10 ft	15092-94-1	Lead-212	0.77	2.27	pCi/g	9/ 13	1.49	1.49	--	--	1.49	NO:3
Soil 0-10 ft	15067-28-4	Lead-214	0.93	75.62	pCi/g	9/ 13	21.4	21.4	--	--	21.4	NO:3
Soil 0-10 ft	13966-00-2	Potassium-40	13.39	25.37	pCi/g	6/ 6	22.4	22.4	27.6	17.5	4.9	NO:1
Soil 0-10 ft	15100-28-4	Protactinium-234	5.87	13.41	pCi/g	2/ 13	7.2	7.2	--	--	7.2	NO:3
Soil 0-10 ft	13982-63-3	Radium-226	0.64	75.78	pCi/g	19/ 19	15.2	15.2	1.42	0.95	14.25	YES
Soil 0-10 ft	15262-20-1	Radium-228	0.46	1.46	pCi/g	18/ 19	1.07	1.07	1.41	0.99	0.08	YES*
Soil 0-10 ft	14913-50-9	Thallium-208	0.25	1.53	pCi/g	13/ 13	0.99	0.99	--	--	0.99	NO:3
Soil 0-10 ft	14274-82-9	Thorium-228	0.81	1.85	pCi/g	18/ 19	1.85	1.85	1.53	1.13	0.72	YES
Soil 0-10 ft	14269-63-7	Thorium-230	1.22	79.04	pCi/g	19/ 19	14.7	14.7	2.56	1.45	13.25	YES
Soil 0-10 ft	7440-29-1	Thorium-232	0.76	15.95	pCi/g	19/ 19	3.31	3.31	1.53	1.07	2.24	YES
Soil 0-10 ft	15065-10-8	Thorium-234	1.96	8.22	pCi/g	9/ 13	3.57	3.57	--	--	3.57	NO:3
Soil 0-10 ft	13966-29-5	Uranium-234	1.31	21.23	pCi/g	13/ 13	9.64	9.64	2.88	1.29	8.35	YES
Soil 0-10 ft	15117-96-1	Uranium-235	0.11	1.33	pCi/g	10/ 19	1.12	1.12	0.21	0.14	0.98	YES
Soil 0-10 ft	24678-82-8	Uranium-238	1.31	21.96	pCi/g	13/ 19	6.15	6.15	2.88	1.29	4.86	YES
Soil 0-2 ft	14331-83-0	Actinium-228	0.46	1.46	pCi/g	7/ 8	1.08	1.08	--	--	1.08	NO:3
Soil 0-2 ft	14913-49-6	Bismuth-212	0.7	1.67	pCi/g	5/ 8	1.08	1.08	--	--	1.08	NO:3
Soil 0-2 ft	14733-03-0	Bismuth-214	0.82	75.94	pCi/g	8/ 8	75.9	75.9	--	--	75.9	NO:3
Soil 0-2 ft	10045-97-3	Cesium-137	0.08	0.28	pCi/g	4/ 10	0.14	0.14	0.47	0.12	0.02	NO:1
Soil 0-2 ft	10198-40-0	Cobalt-60	0.14	0.14	pCi/g	1/ 8	0.06	0.06	--	--	0.06	NO:2
Soil 0-2 ft	15092-94-1	Lead-212	0.77	2.27	pCi/g	7/ 8	1.51	1.51	--	--	1.51	NO:3
Soil 0-2 ft	15067-28-4	Lead-214	0.93	75.62	pCi/g	7/ 8	34.4	34.4	--	--	34.4	NO:3
Soil 0-2 ft	13966-00-2	Potassium-40	16.14	17.56	pCi/g	2/ 2	17.6	17.56	27.6	17.5	0.06	NO:1
Soil 0-2 ft	15100-28-4	Protactinium-234	5.87	13.41	pCi/g	2/ 8	9.99	9.99	--	--	9.99	NO:3
Soil 0-2 ft	13982-63-3	Radium-226	0.71	75.78	pCi/g	10/ 10	75.8	75.78	1.42	0.95	74.83	YES
Soil 0-2 ft	15262-20-1	Radium-228	0.46	1.46	pCi/g	9/ 10	1.05	1.05	1.41	0.99	0.06	YES*
Soil 0-2 ft	14913-50-9	Thallium-208	0.25	1.53	pCi/g	8/ 8	1.35	1.35	--	--	1.35	NO:3
Soil 0-2 ft	14274-82-9	Thorium-228	0.88	1.85	pCi/g	9/ 10	1.85	1.85	1.53	1.13	0.72	YES
Soil 0-2 ft	14269-63-7	Thorium-230	1.5	79.04	pCi/g	10/ 10	68.3	68.3	2.56	1.45	66.85	YES
Soil 0-2 ft	7440-29-1	Thorium-232	0.9	15.95	pCi/g	10/ 10	5.37	5.37	1.53	1.07	4.3	YES
Soil 0-2 ft	15065-10-8	Thorium-234	1.96	8.22	pCi/g	6/ 8	4.67	4.67	--	--	4.67	NO:3
Soil 0-2 ft	13966-29-5	Uranium-234	1.4	21.23	pCi/g	8/ 8	21.2	21.2	2.88	1.29	19.91	YES
Soil 0-2 ft	15117-96-1	Uranium-235	0.16	1.33	pCi/g	6/ 10	1.33	1.33	0.21	0.14	1.19	YES
Soil 0-2 ft	24678-82-8	Uranium-238	1.43	21.96	pCi/g	8/ 10	12.4	12.4	2.88	1.29	11.11	YES

a Industrial workers are assumed to be exposed to soil 0-2 feet below land surface. Hypothetical future site residents and subsistence farmer are assumed to be exposed to soil 0-10 feet below land surface.
b Value for comparison defined as the lower of the 95% UCL and the maximum detected concentration.
c Background concentration described using the 95% UTL.
d Average background concentration for each radionuclide was subtracted from the value for comparison to determine the net exposure point concentration (EPC) used in the dose assessment.

NO:1 Value for comparison less than background value
NO:2 Eliminated on basis of weight of evidence. See Section 6.2.3.
NO:3 Short-lived radionuclide, evaluated as part of decay series
YES Constituent of potential concern (COPC).
YES* Retained on basis of weight of evidence. See Section 6.2.3.

Table 6.9 Input Parameter Used for RESRAD Calculations at The Painesville Site

RESRAD Parameter	Units	RESRAD default	Industrial PNV RI	Residential PNV RI	Subsistence PNV RI	Citation
Area of contaminated zone	m^2	10,000	varies	varies	varies	Each EU has its own area
Thickness of contaminated zone	m	2	2	2	2	RESRAD Default
Length parallel to aquifer flow	m	100	100	100	100	RESRAD Default
Time since placement of material	yr	0	0	0	0	RESRAD Default
Cover depth	m	0	0	0	0	RESRAD Default
Density of cover material	g/m^3	1.5	NU	NU	NU	No cover assumed
Cover depth erosion rate	m/yr	0.001	NU	NU	NU	No cover assumed
Density of contaminated zone	g/m^3	1.5	1.8	1.8	1.8	Site specific
Contaminated zone erosion rate	m/yr	0.001	0.0006	0.0006	0.0006	DCH pg 78
Contaminated zone total porosity	unitless	0.4	0.31	0.31	0.31	Site specific
Contaminated zone field capacity	unitless	0.2	0.15	0.15	0.15	Site specific
Contaminated zone hydraulic conductivity	m/yr	10	3.47	3.47	3.47	Site specific
Contaminated zone b parameter	unitless	5.3	5.3	5.3	5.3	RESRAD Default
Humidity in air	g/m^3	8	NU	NU	NU	
Average annual wind speed	m/sec	2	2	2	2	RESRAD Default
Evapotranspiration coefficient	unitless	0.5	0.5	0.5	0.5	RESRAD Default
Precipitation	m/yr	1	1	1	1	RESRAD Default
Irrigation	m/yr	0.2	0.2	0.2	0.2	RESRAD Default
Irrigation mode	unitless	Overhead	Overhead	Overhead	Overhead	RESRAD Default
Runoff coefficient	unitless	0.2	0.2	0.2	0.2	RESRAD Default
Watershed area for nearby stream or pond	m^2	1.00E+06	NU	NU	1.00E+06	RESRAD Default
Accuracy for water/soil computations	unitless	0.001	NU	NU	0.001	RESRAD Default
Saturated zone density	g/m^3	1.5	NU	NU	1.5	RESRAD Default
Saturated zone total porosity	unitless	0.4	NU	NU	0.4	RESRAD Default
Saturated zone effective porosity	unitless	0.2	NU	NU	0.2	RESRAD Default
Saturated zone field capacity	unitless	0.2	NU	NU	0.2	RESRAD Default
Saturated zone hydraulic conductivity	m/yr	100	NU	NU	100	RESRAD Default
Saturated zone hydraulic gradient	unitless	0.02	NU	NU	0.02	RESRAD Default
Saturated zone b parameter	unitless	5.3	NU	NU	5.3	RESRAD Default
Water table drop rate	m/yr	0.001	NU	NU	0.001	RESRAD Default
Well pump intake depth (m below water table)	m	10	NU	NU	10	RESRAD Default
Model: Nondispersion (ND) or Mass-Balance (MB)	unitless	ND	NU	NU	ND	RESRAD Default
Well pumping rate	m^3/yr	250	NU	NU	250	RESRAD Default
Number of unsaturated zone strata	unitless	1	NU	NU	1	RESRAD Default
Unsaturated zone thickness	m	4	NU	NU	4	RESRAD Default
Unsaturated zone soil density	g/m^3	1.5	NU	NU	1.5	RESRAD Default
Unsaturated zone total porosity	unitless	0.4	NU	NU	0.4	RESRAD Default
Unsaturated zone effective porosity	unitless	0.2	NU	NU	0.2	RESRAD Default
Unsaturated zone field capacity	unitless	0.2	NU	NU	0.2	RESRAD Default
Unsaturated zone b parameter	unitless	5.3	NU	NU	5.3	RESRAD Default
Unsaturated zone hydraulic conductivity	m/yr	10	NU	NU	10	RESRAD Default
Distribution coefficient - actinium	cm^3/g	20	2400	2400	2400	RESRAD manual for Clay soil
Distribution coefficient - protactinium	cm^3/g	50	2700	2700	2700	RESRAD manual for Clay soil
Distribution coefficient - lead	cm^3/g	100	550	550	550	Rounded down from Ohio EPA
Distribution coefficient - radium	cm^3/g	70	9100	9100	9100	Measured Value at site
Distribution coefficient - thorium	cm^3/g	60,000	5,800	5,800	5,800	Measured Value at site
Distribution coefficient - uranium	cm^3/g	50	1600	350	350	Measured Value at site
Inhalation rate	m^3/yr	8,400	7,300	7,300	7,300	RAGS Part B
Mass loading for inhalation	g/m^3	0.0001	0.0001	0.0001	0.0001	RESRAD Default
Exposure duration	yr	30	25	30	30	RESRAD Default
Shielding factor, inhalation	unitless	0.4	0.4	0.4	0.4	RESRAD Default
Shielding factor, external gamma	unitless	0.7	0.4	0.4	0.4	OSWER Directive 9355.4-16
Fraction of time spent indoors	unitless	0.5	0.20	0.66	0.66	Exposure Factors Handbook Volume 1.
Fraction of time spent outdoors (on site)	unitless	0.25	0.080	0.080	0.29	Scenario dependent 7 hrs/day (.29)
Shape factor flag, external gamma	unitless	1	1	1	1	RESRAD Default
Fruits, vegetables and grain consumption	kg/yr	160	NU	NU	160	RESRAD Default
Leafy vegetable consumption	kg/yr	14	NU	NU	14	RESRAD Default
Milk consumption	L/yr	92	NU	NU	92	RESRAD Default
Meat and poultry consumption	kg/yr	63	NU	NU	63	RESRAD Default
Fish consumption	kg/yr	5.4	NU	NU	5.4	RESRAD Default
Other seafood consumption	kg/yr	0.9	NU	NU	0.9	RESRAD Default
Soil ingestion rate	g/yr	36.5	18.25	36.5	36.5	RESRAD Default, EPA 2000
Drinking water intake	L/yr	510	NU	NU	839.5	2.4L/d
Contamination fraction of drinking water	unitless	1	NU	NU	1	RESRAD Default
Contamination fraction of household water	unitless	1	NU	NU	1	RESRAD Default
Contamination fraction of livestock water	unitless	1	NU	NU	1	RESRAD Default
Contamination fraction of irrigation water	unitless	1	NU	NU	1	RESRAD Default
Contamination fraction of aquatic food	unitless	0.5	NU	NU	NU	No surface water or sed Contamination
Contamination fraction of plant food	unitless	-1	NU	NU	0.3	RESRAD Calculates except above 600 m then 0.3

PNV = Painesville; RI = Remedial Investigation; FS = Feasibility Study, NU = not used

Table 6.9 Input Parameter Used for RESRAD Calculations at The Painesville Site

RESRAD Parameter	Units	RESRAD default	Industrial PNV RI	Residential PNV RI	Subsistence PNV RI	Citation
Contamination fraction of meat	unitless	-1	NU	NU	-1	RESRAD Default
Contamination fraction of milk	unitless	-1	NU	NU	-1	RESRAD Default
Livestock fodder intake for meat	kg/day	68	NU	NU	68	RESRAD Default
Livestock fodder intake for milk	kg/day	55	NU	NU	55	RESRAD Default
Livestock water intake for meat	L/day	50	NU	NU	50	RESRAD Default
Livestock water intake for milk	L/day	160	NU	NU	160	RESRAD Default
Livestock soil intake	kg/day	0.5	NU	NU	0.5	RESRAD Default
Mass loading for foliar deposition	g/m^3	0.0001	NU	NU	0.0001	RESRAD Default
Depth of soil mixing layer	m	0.15	0.05	0.05	0.15	RESRAD Default for farming
Depth of roots	m	0.9	NU	NU	0.9	RESRAD Default
Drinking water fraction from ground water	unitless	1	NU	NU	1	RESRAD Default
Household water fraction from ground water	unitless	1	NU	NU	NU	Radon pathway turned off
Livestock water fraction from ground water	unitless	1	NU	NU	1	RESRAD Default
Irrigation fraction from ground water	unitless	1	NU	NU	1	RESRAD Default
Wet weight crop yield for non-leafy	kg/m^2	0.7	NU	NU	0.7	RESRAD Default
Wet weight crop yield for leafy	kg/m^2	1.5	NU	NU	1.5	RESRAD Default
Wet weight crop yield for fodder	kg/m^2	1.1	NU	NU	1.1	RESRAD Default
Growing season for non-leafy	years	0.17	NU	NU	0.17	RESRAD Default
Growing season for leafy	years	0.25	NU	NU	0.25	RESRAD Default
Growing season for fodder	years	0.08	NU	NU	0.08	RESRAD Default
Translocation factor for non-leafy	unitless	0.1	NU	NU	0.1	RESRAD Default
Translocation factor for leafy	unitless	1.0	NU	NU	1.0	RESRAD Default
Translocation factor for fodder	unitless	1.0	NU	NU	1.0	RESRAD Default
Dry foliar interception fraction for non-leafy	unitless	0.25	NU	NU	0.25	RESRAD Default
Dry foliar interception fraction for leafy	unitless	0.25	NU	NU	0.25	RESRAD Default
Dry foliar interception fraction for fodder	unitless	0.25	NU	NU	0.25	RESRAD Default
Wet foliar interception fraction for non-leafy	unitless	0.25	NU	NU	0.25	RESRAD Default
Wet foliar interception fraction for leafy	unitless	0.25	NU	NU	0.25	RESRAD Default
Wet foliar interception fraction for fodder	unitless	0.25	NU	NU	0.25	RESRAD Default
Weathering removal constant for vegetation	unitless	20	NU	NU	20	RESRAD Default
Storage time: fruits, non-leafy vegetables, and grain	days	14	NU	NU	14	RESRAD Default
Storage time: leafy vegetables	days	1	NU	NU	1	RESRAD Default
Storage time: milk	days	1	NU	NU	1	RESRAD Default
Storage time: meat and poultry	days	20	NU	NU	20	RESRAD Default
Storage time: fish	days	7	NU	NU	7	RESRAD Default
Storage time: crustacea and mollusks	days	7	NU	NU	7	RESRAD Default
Storage time: well water	days	1	NU	NU	1	RESRAD Default
Storage time: surface water	days	1	NU	NU	1	RESRAD Default
Storage time: livestock fodder	days	45	NU	NU	45	RESRAD Default
Thickness of building foundation	m	0.15	NU	NU	NU	Radon Pathway OFF
Bulk density of building foundation	g/cm^3	2.4	NU	NU	NU	Radon Pathway OFF
Total porosity of the cover material	unitless	0.4	NU	NU	NU	Radon Pathway OFF
Total porosity of the building foundation	unitless	0.1	NU	NU	NU	Radon Pathway OFF
Volumetric water constant of the cover material	unitless	0.05	NU	NU	NU	Radon Pathway OFF
Volumetric water constant of the foundation	unitless	0.03	NU	NU	NU	Radon Pathway OFF
Diffusion coef. for radon gas in cover material	m/sec	2.00E-06	NU	NU	NU	Radon Pathway OFF
Diffusion coef. for radon gas in foundation material	m/sec	3.00E-07	NU	NU	NU	Radon Pathway OFF
Diffusion coef. for radon gas in contaminated zone soil	m/sec	2.00E-06	NU	NU	NU	Radon Pathway OFF
Radon vertical dimension of mixing	m	2	NU	NU	NU	Radon Pathway OFF
Average building air exchange rate	1/hour	0.5	NU	NU	NU	Radon Pathway OFF
Height of the building (room)	m	2.5	NU	NU	NU	Radon Pathway OFF
Building interior area factor	unitless	0	NU	NU	NU	Radon Pathway OFF
Building depth below ground surface	m	-1	NU	NU	NU	Radon Pathway OFF
Emanating power of Rn-222 gas	unitless	0.25	NU	NU	NU	Radon Pathway OFF
Emanating power of Rn-220 gas	unitless	0.15	NU	NU	NU	Radon Pathway OFF
Pathway - external gamma	unitless	active	active	active	active	
Pathway - inhalation (w/o radon)	unitless	active	active	active	active	
Pathway - plant ingestion	unitless	active	inactive	inactive	active	
Pathway - meat ingestion	unitless	active	inactive	inactive	active	
Pathway - milk ingestion	unitless	active	inactive	inactive	active	
Pathway - aquatic foods	unitless	active	inactive	inactive	inactive	No aquatic foods available on site
Pathway - drinking water	unitless	active	inactive	inactive	active	
Pathway - soil ingestion	unitless	active	active	active	active	
Pathway - radon	unitless	active	inactive	inactive	inactive	

PNV = Painesville; RI = Remedial Investigation; FS = Feasibility Study, NU = not used

Table 6.10 Non-Cancer Uranium Risk for an Industrial Worker Exposed to Surface Soil

Constituent	EPC		NON-CANCER EFFECTS				
			Route-Specific HQ				Non-Cancer HI Total
	pCi/g	mg/kg	Oral	Dermal	Inhalation Dust	Inhalation VOCs	
Surface Soil (0-2 feet)							
Uranium EU -1	11.35	34.3	1.9E-03	NA	NA	NAP	1.9E-03
Uranium EU -2	2.36	7.1	3.8E-04	NA	NA	NAP	3.8E-04
Uranium EU -3	19.71	59.5	3.2E-03	NA	NA	NAP	3.2E-03
Uranium EU -4	1.65	4.9	2.7E-04	NA	NA	NAP	2.7E-04
Uranium EU -5	3.32	10	5.4E-04	NA	NA	NAP	5.4E-04
Uranium EU -6	18.61	56.2	3.0E-03	NA	NA	NAP	3.0E-03
Uranium EU -7	--	--	NA	NA	NA	NAP	0.0E+00
Uranium EU -8	4.86	14.7	7.9E-04	NA	NA	NAP	7.9E-04

EPC — Exposure point concentration
Total Uranium (mg/kg) = (U-238 EPC (pCi/g) * 2.046)/0.677
mg/kg — Milligram per kilogram.
NA — Not available; insufficient toxicity data.
NAP — Not applicable pathway; not a VOC.
pCi/g — Picocuries per gram.

Table 6.11 Non-Cancer Uranium Risk for a Resident Exposed to Total Soil

Constituent	EPC		NON-CANCER EFFECTS				
			Route-Specific HQ				Non-Cancer HI Total
	pCi/g	mg/kg	Oral	Dermal	Inhalation Dust	Inhalation VOCs	
Total Soil (0-10 feet)							
Uranium EU -1	13.71	41.4	6.3E-03	NA	NA	NAP	6.3E-03
Uranium EU -2	3.6	10.9	1.6E-03	NA	NA	NAP	1.6E-03
Uranium EU -3	27.71	83.7	1.3E-02	NA	NA	NAP	1.3E-02
Uranium EU -4	2.13	6.4	9.7E-04	NA	NA	NAP	9.7E-04
Uranium EU -5	4.97	15	2.3E-03	NA	NA	NAP	2.3E-03
Uranium EU -6	31.41	94.9	1.4E-02	NA	NA	NAP	1.4E-02
Uranium EU -7	--	--	--	NA	NA	NAP	0.0E+00
Uranium EU -8	11.11	33.6	5.1E-03	NA	NA	NAP	5.1E-03

EPC — Exposure point concentration
Total Uranium (mg/kg) = (U-238 EPC (pCi/g) * 2.046)/0.677

mg/kg — Milligram per kilogram.

NA — Not available; insufficient toxicity data.

NAP — Not applicable pathway; not a VOC.

pCi/g — Picocuries per gram.

Table 6.12 Non-cancer Uranium Risk for a Subsistence Farmer Exposed to Total Soil (0 - 10 ft. bgs)

Constituent	EPC		CV	NON-CANCER EFFECTS					
				Route-Specific HQ					Non-Cancer HI Total
	pCi/g	mg/kg	(mg/kg)	Oral	Dermal	Inhalation Dust	Inhalation VOCs	Plant Ingestion	
Total Soil (0-10 ft. bgs)									
Uranium EU-1	13.71	41.4	0.08	2.3E-02	NA	NA	NAP	6.0E-02	8.3E-02
Uranium EU-2	3.6	10.9	0.02	6.0E-03	NA	NA	NAP	1.6E-02	2.2E-02
Uranium EU-3	27.71	83.7	0.17	4.6E-02	NA	NA	NAP	1.2E-01	1.7E-01
Uranium EU-4	2.13	6.4	0.01	3.5E-03	NA	NA	NAP	9.4E-03	1.3E-02
Uranium EU-5	4.97	15	0.03	8.2E-03	NA	NA	NAP	2.2E-02	3.0E-02
Uranium EU-6	31.41	94.9	0.19	5.2E-02	NA	NA	NAP	1.4E-01	1.9E-01
Uranium EU-7	--	--	--	--	NA	NA	NAP	--	--
Uranium EU-8	11.11	33.6	0.07	1.8E-02	NA	NA	NAP	4.9E-02	6.8E-02

Bold Indicates risk values that exceed criteria of 1.0E-06 for cancer or an HI of 1.0E+00 for non-cancer
CV Constituent concentration in plant tissue (mg/kg plant $_{tissue}$).
EPC Exposure point concentration
mg/kg Milligram per kilogram.
NA Not available; insufficient toxicity data.
NAP Not applicable pathway; not a VOC.
NC Not a suspected carcinogen.
RME Reasonable maximum exposure.
SVOCs Semi-volatile organic compounds.
VOCs Volatile organic compounds.

Table 6.13. Painesville Constituents of Concern by Medium and Receptor *

Receptor	Medium	
	Surface Soil (0-2 feet)	Total Soil (0-10 feet)
Industrial Worker	Ac-227 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-235	
Resident		Ac-227 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-235 U-234 U-238
Subsistence Farmer		Ac-227 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-235 U-238
* Any radionuclide producing an estimated all-pathway radiological risk of 1.0×10^{-6} or larger.		

Table 6.14. Radiological Dose Summary for the Painesville Site

Receptor	Surface Soil (0-2 ft bls)	Total Soil (0-10 ft bls)	Year
Exposure Unit 1 - Investigative Area A			
Industrial Worker	8.6E+01	-	0
Resident	-	1.0E+02	19.41
Subsistence Farmer	-	3.5E+02	0
Exposure Unit 2 - Investigative Area B			
Industrial Worker	7.6E+00	-	0
Resident	-	2.1E+01	1000
Subsistence Farmer	-	7.0E+01	1000
Exposure Unit 3 - Investigative Area C			
Industrial Worker	4.9E+01	-	**1000**
Resident	-	8.2E+01	**1000**
Subsistence Farmer	-	3.3E+02	**0**
Exposure Unit 4 - Investigative Area D			
Industrial Worker	2.26E+01	-	**1000**
Resident	-	2.8E+01	1000
Subsistence Farmer	-	7.9E+01	332.6
Exposure Unit 5 - Investigative Area G			
Industrial Worker	1.20E+01	-	**0**
Resident	-	1.9E+01	1000
Subsistence Farmer	-	3.7E+01	1000
Exposure Unit 6 - Investigative Area I			
Industrial Worker	1.70E+02	-	**1000**
Resident	-	4.4E+02	32.5
Subsistence Farmer	-	1.4E+03	113.8
Exposure Unit 7 - Post 1950 Structures			
Industrial Worker	2.01E+00	-	
Resident	-	4.5E+00	0
Subsistence Farmer	-	1.5E+01	0
Exposure Unit 8 - Rubble Pile			
Industrial Worker	1.13E+02	-	**38**
Resident	-	5.9E+01	48.25
Subsistence Farmer	-	1.2E+02	33.7

"-" indicates media was not evaluated

"*" No ROPCs identified.

Maximum dose between year 0 and year 1000 is presented.

Table 6.15. Baseline Radiological Risk Summary for the Painesville Site

Receptor	Exposure Unit 1 - Investigative Area A	Exposure Unit 2 - Investigative Area B	Exposure Unit 3 - Investigative Area C	Exposure Unit 4 - Investigative Area D
Industrial Worker	1.6×10^{-3}	1.4×10^{-4}	9.1×10^{-4}	4.2×10^{-4}
Resident	2.2×10^{-3}	4.5×10^{-4}	1.8×10^{-3}	6.3×10^{-4}
Subsistence Farmer*	6.0×10^{-3}	1.2×10^{-3}	5.0×10^{-3}	1.4×10^{-3}

Receptor	Exposure Unit 5 - Investigative Area G	Exposure Unit 6 - Investigative Area I	Exposure Unit 7 - Post 1950 Structures	Exposure Unit 8 - Rubble Pile
Industrial Worker	5.7×10^{-4}	3.2×10^{-3}	NE	5.4×10^{-3}
Resident	4.2×10^{-4}	9.9×10^{-3}	NE	1.3×10^{-3}
Subsistence Farmer*	7.7×10^{-4}	2.4×10^{-2}	NE	2.4×10^{-3}

Maximum Risk due to exposure to soil is presented.

"*" Subsistence farmer scenario includes groundwater and food.

"NE" No ROPCs identified so risk not evaluated.

Table 6.16. Remedial Action Objectives for the Painesville Site

Receptor	Medium (units)	Radionuclide	Action Level and Basis OAC 3701-1-38 [a,c]
Industrial Worker	Surface Soil (pCi/g)	Ac-227	53
		Pb-210	660
		Ra-226[d]	15
		Ra-228	24
		Th-228	20
		Th-230[b]	43
		Th-232	11
		Total U	1500
Resident	Total Soil (pCi/g)	Ac-227	21
		Pb-210	110
		Ra-226[d]	8.3
		Ra-228	13
		Th-228	11
		Th-230[b]	22
		Th-232	5.7
		Total U	710
Subsistence Farmer	Total Soil (pCi/g)	Ac-227	6.8
		Pb-210	6.2
		Ra-226[d]	2.0
		Ra-228	3.9
		Th-228	6.1
		Th-230[b]	5.9
		Th-232	2.3
		Total U	260

All values rounded to two significant digits.

[a] Concentration corresponding to 25 mrem/yr

[b] Value conservatively represents Th-230 limit for year 1,000 allowing ingrowth of Ra-226

[c] Values listed under 10 CFR 20 are annual doses.

[d] Ra-226 criteria includes Pb-210 contribution to dose.

Table 6.17. Uptake Factors for Radiological COPCs at Painesville EUs

Radionuclide (parent and decay products)[a]	BAFi (g soil/ g worm)	Source of BAFi	BAFmamm (g worm/ g tissue)[b]	Uptake factor[c]
Actinium-227	1.25E-01	e	1.25E-01	1.56E-02
Thorium-227 (98.62% of At-227)	5.00E-03	d	3.00E-04	1.50E-06
Francium-223 (1.38% of At-227)	1.25E-01	e	1.25E-01	1.56E-02
Radium-223 (100% of Th-227 and Fr-223)	1.25E-02	e	1.25E-02	1.56E-04
Radon-219	0.00E+00	f	0.00E+00	0.00E+00
Polonium-215	4.75E-03	e	4.75E-01	2.26E-03
Lead-211	2.00E-02	d	1.50E-02	3.00E-04
Bismuth-211	2.00E-02	e	2.00E-02	4.00E-04
Thallium-207 (99.72% of Bi-211)	2.00E+00	d	2.00E+00	4.00E+00
Polonium-211 (0.28% of Bi-211)	4.75E-03	e	4.75E-01	2.26E-03
Americium-241	1.75E-02	e	1.75E-02	3.06E-04
Lead-210	2.00E-02	d	1.50E-02	3.00E-04
Bismuth-210	2.00E-02	e	2.00E-02	4.00E-04
Protactinium-231	5.00E-02	d	5.00E-04	2.50E-05
Radium-226	7.50E-02	d	1.25E-02	9.38E-04
Radon-222	0.00E+00	f	0.00E+00	0.00E+00
Polonium-218	4.75E-03	e	4.75E-01	2.26E-03
Lead-214 (99.98% of Po-218)	2.00E-02	d	1.50E-02	3.00E-04
Astatine-218 (0.02% of Po-218)	5.00E-01	e	5.00E-01	2.50E-01
Bismuth-214 (100% of Pb-214 and At-218)	2.00E-02	e	2.00E-02	4.00E-04
Polonium-214	4.75E-03	d	4.75E-03	2.26E-05
Thorium-228	5.00E-03	d	3.00E-04	1.50E-06
Radium-224	7.50E-02	d	1.25E-02	9.38E-04
Radon-220	0.00E+00	f	0.00E+00	0.00E+00
Polonium-216	4.75E-03	e	4.75E-01	2.26E-03
Lead-212	2.00E-02	d	1.50E-02	3.00E-04
Bismuth-212	2.00E-02	e	2.00E-02	4.00E-04
Polonium-212 (64.07% of Bi-212)	4.75E-03	e	4.75E-01	2.26E-03
Thallium-208 (35.93% of Bi-212)	2.00E+00	d	2.00E+00	4.00E+00
Thorium-230	5.00E-03	d	3.00E-04	1.50E-06
Thorium-232	5.00E-03	d	3.00E-04	1.50E-06
Radium-228	7.50E-02	d	1.25E-02	9.38E-04
Actinium-228	1.25E-03	e	1.25E-03	1.56E-06
Uranium-234	1.00E-02	d	1.00E-02	1.00E-04
Uranium-235	1.00E-02	d	1.00E-02	1.00E-04
Thorium-231	5.00E-03	d	3.00E-04	1.50E-06
Uranium-238	1.00E-02	d	1.00E-02	1.00E-04
Thorium-234	5.00E-03	d	3.00E-04	1.50E-06
Protactinium-234m	5.00E-02	d	5.00E-04	2.50E-05
Protactinium-234	5.00E-02	d	5.00E-04	2.50E-05

[a] Decay products are indented from their parents

[b] Ingestion-to-beef transfer factors (mg/kg tissue per mg/d, Baes et al. 1984) multiplied by 50 kg food/d

[c] BAFi x BAFmamm

[d] Bioaccumulation factor for plants, the highest BAF available (Baes et al. 1984)

[e] Bioaccumulation factor for mammals, the highest BAF available (Ba value from

[f] Noble gases, including radon, are not known to biaccumulate.

Table 6.18 Soil Benchmarks for Exposure of Soil Invertebrates to Radiological COPCs and Decay Products

Radionuclide (parent and decay products)[a]	Dose Conversion Factor[b]	Alpha energy[c]	Beta energy[c]	Gamma energy[c]	Gamma absorption[d]	BAFi[e]	Subsurface exposure[f]	Surface exposure[g]	Internal exposure[h]	Screening benchmark (pCi/g soil)[i]
Actinium-227	2.62E-21	6.91E-02	1.56E-02	2.31E-04	1.00E+00	1.25E-01	8.49E-07	0.00E+00	8.93E-06	2.55E+02
Thorium-227 (98.62% of At-227)	2.65E-18	5.88E+00	5.30E-02	1.10E-01	9.50E-03	5.00E-03	2.90E-06	0.00E+00	3.01E-05	2.52E+02
Francium-223 (1.38% of At-227)	1.01E-18	0.00E+00	4.00E-01	5.90E-02	8.60E-03	1.25E-01	2.15E-05	0.00E+00	2.56E-06	3.52E+00
Radium-223 (100% of Th-227 and Fr-223)	3.1E-18	5.67E+00	7.60E-02	1.34E-01	1.00E-02	1.25E-02	4.15E-06	0.00E+00	7.24E-05	2.55E+02
Radon-219	1.54E-18	6.76E+00	6.30E-03	5.58E-02	8.40E-03	0.00E+00	3.63E-07	0.00E+00	0.00E+00	2.55E+02
Polonium-215	4.98E-21	7.39E+00	6.30E-06	1.76E-04	1.00E+00	4.75E-03	9.78E-09	0.00E+00	3.59E-05	2.55E+02
Lead-211	1.46E-18	0.00E+00	4.56E-01	5.10E-02	1.10E-02	2.00E-02	2.45E-05	0.00E+00	4.67E-07	2.55E+02
Bismuth-211	1.28E-18	6.55E+00	9.78E-03	4.66E-02	2.70E-02	2.00E-02	5.92E-07	0.00E+00	1.34E-04	2.55E+02
Thallium-207 (99.72% of Bi-211)	9.48E-20	0.00E+00	4.93E-01	2.21E-03	6.30E-01	2.00E+00	2.65E-05	0.00E+00	5.05E-05	2.54E+02
Polonium-211 (0.28% of Bi-211)	2.24E-19	7.44E+00	1.69E-04	7.79E-03	6.30E-01	4.75E-03	2.72E-07	0.00E+00	3.61E-05	7.13E-01
Americium-241	2.34E-19	5.48E+00	5.20E-02	3.30E-02	4.00E-02	1.75E-02	2.86E-06	0.00E+00	9.80E-05	9.91E+02
Lead-210	1.31E-20	0.00E+00	3.80E-02	4.81E-03	6.30E-01	2.00E-02	2.20E-06	0.00E+00	4.19E-08	4.25E+03
Bismuth-210	1.86E-20	0.00E+00	3.89E-01	0.00E+00	0.00E+00	2.00E-02	2.09E-05	0.00E+00	3.98E-07	4.25E+03
Protactinium-231	9.62E-19	4.97E+00	6.50E-02	4.76E-02	1.50E-02	5.00E-02	3.53E-06	0.00E+00	2.54E-04	3.88E+02
Radium-226	1.65E-19	4.77E+00	3.59E-03	6.74E-03	6.30E-01	7.50E-02	4.20E-07	0.00E+00	3.66E-04	2.03E+02
Radon-222	1.1E-20	5.49E+00	1.09E-05	3.98E-04	1.00E+00	0.00E+00	2.19E-08	0.00E+00	0.00E+00	2.03E+02
Polonium-218	2.63E-22	6.00E+00	1.42E-05	9.12E-06	1.00E+00	4.75E-03	1.25E-09	0.00E+00	2.91E-05	2.03E+02
Lead-214 (99.98% of Po-218)	6.7E-18	0.00E+00	2.93E-01	2.50E-01	1.00E-02	2.00E-02	1.59E-05	0.00E+00	3.02E-07	2.03E+02
Astatine-218 (0.02% of Po-218)	3.13E-20	6.70E+00	4.00E-02	6.72E-03	6.30E-01	5.00E-01	2.37E-06	0.00E+00	3.42E-03	4.06E-02
Bismuth-214 (100% of Pb-214 and At-218)	4.36E-17	0.00E+00	6.59E-01	1.51E+00	8.50E-02	2.00E-02	4.22E-05	0.00E+00	8.04E-07	2.03E+02
Polonium-214	2.4E-21	7.69E+00	8.19E-07	8.33E-05	1.00E+00	4.75E-03	4.51E-09	0.00E+00	3.73E-05	2.03E+02
Thorium-228	4.17E-20	5.40E+00	2.10E-02	3.00E-03	6.30E-01	5.00E-03	1.23E-06	0.00E+00	2.76E-05	1.56E+02
Radium-224	2.62E-19	5.67E+00	2.00E-03	1.00E-02	1.00E-02	7.50E-02	1.13E-07	0.00E+00	4.35E-04	1.56E+02
Radon-220	1.1E-20	6.29E+00	8.91E-06	3.85E-04	1.00E+00	0.00E+00	2.11E-08	0.00E+00	0.00E+00	1.56E+02
Polonium-216	4.87E-22	6.79E+00	1.61E-07	1.69E-05	1.00E+00	4.75E-03	9.15E-10	0.00E+00	3.30E-05	1.56E+02
Lead-212	3.62E-18	0.00E+00	1.76E-01	1.48E-01	1.00E-01	2.00E-02	1.02E-05	0.00E+00	1.95E-07	1.56E+02
Bismuth-212	5.36E-18	2.17E+00	4.72E-01	1.86E-01	1.00E-01	2.00E-02	2.63E-05	0.00E+00	4.49E-05	1.56E+02
Polonium-212 (64.07% of Bi-212)	0	8.79E+00	0.00E+00	0.00E+00	0.00E+00	4.75E-03	0.00E+00	0.00E+00	4.26E-05	9.98E+01
Thallium-208 (35.93% of Bi-212)	9.68E-17	0.00E+00	5.98E-01	3.38E+00	1.00E-02	2.00E+00	3.39E-05	0.00E+00	6.46E-05	5.61E+01
Thorium-230	6.39E-21	4.67E+00	1.46E-02	1.55E-03	6.30E-01	5.00E-03	8.36E-07	0.00E+00	2.39E-05	4.05E+03
Thorium-232	2.78E-21	4.00E+00	1.20E-02	1.33E-03	6.30E-01	5.00E-03	6.89E-07	0.00E+00	2.04E-05	1.88E+03
Radium-228	0	0.00E+00	1.69E-02	4.14E-09	1.00E+00	7.50E-02	9.07E-07	0.00E+00	6.48E-08	1.88E+03
Actinium-228	2.76E-17	0.00E+00	4.75E-01	9.71E-01	1.10E-01	1.25E-03	3.12E-05	0.00E+00	3.72E-08	1.88E+03
Uranium-234	2.14E-21	4.76E+00	1.30E-02	1.73E-03	6.30E-01	1.00E-02	7.56E-07	0.00E+00	4.86E-05	2.02E+03
Uranium-235	3.75E-18	4.40E+00	4.90E-02	1.56E-01	1.00E-02	1.00E-02	2.71E-06	0.00E+00	4.50E-05	1.76E+03
Thorium-231	1.94E-19	0.00E+00	1.65E-01	2.60E-02	9.00E-02	5.00E-03	8.98E-06	0.00E+00	4.28E-08	1.76E+03

Table 6.18 Soil Benchmarks for Exposure of Soil Invertebrates to Radiological COPCs and Decay Products

Radionuclide (parent and decay products)[a]	Dose Conversion Factor[b]	Alpha energy[c]	Beta energy[c]	Gamma energy[c]	Gamma absorption[d]	BAFi[e]	Subsurface exposure[f]	Surface exposure[g]	Internal exposure[h]	Screening benchmark (pCi/g soil)[i]
Uranium-238	5.52E-22	4.19E+00	1.00E-02	1.36E-03	6.30E-01	1.00E-02	5.83E-07	0.00E+00	4.28E-05	1.07E+03
Thorium-234	1.29E-19	0.00E+00	5.92E-02	9.34E-03	6.30E-01	5.00E-03	3.49E-06	0.00E+00	1.66E-08	1.07E+03
Protactinium-234m	4.2E-19	0.00E+00	8.22E-01	1.20E-02	5.50E-01	5.00E-02	4.45E-05	0.00E+00	2.12E-06	1.07E+03
Protactinium-234	5.38E-17	0.00E+00	4.94E-01	1.92E+00	8.50E-02	5.00E-02	3.53E-05	0.00E+00	1.68E-06	2.71E+03

[a] Decay products are indented from their parents

[b] Dose conversion factors from Eckerman and Ryman (1993)

[c] Decay energies (meV per disintegration) from Eckerman and Ryman (1993)

[d] Gamma absorption factors from Blaylock et al. (1993)

[e] Bioaccumulation factors from Table Rad1

[f] Subsurface exposure = 1.05 x $f_{belowground}$ x 0.0000511 x (Beta energy + Gamma energy x Gamma absorption).

$f_{belowground}$ = 1 = fraction of time animal is assumed to spend belowground.

[g] Surface exposure = $f_{aboveground}$ x 0.7 x 5.12 x 10^{11} x DCF x 2.

.$f_{aboveground}$ = 0 = fraction of time animal is assumed to spend on ground surface.

[h] Internal exposure = 0.0000511 x Uptake factor x (20 x Alpha energy + Beta energy + Gamma energy x Gamma absorption).

[i] Benchmark = activity (pCi/g) resulting in dose of 0.1 rad/d assuming secular equilibrium of parent and daughter products.

Fraction of time below surface	1
Fraction of time on surface	0

Table 6.19. Soil Benchmarks for Exposure of Small Mammals to Radiological COPCs and Decay Products

Radionuclide (parent and decay products)[a]	Dose Conversion Factor[b]	Alpha energy[c]	Beta energy[c]	Gamma energy[c]	Gamma absorption[d]	Uptake factor[e]	Subsurface exposure[f]	Surface exposure[g]	Internal exposure[h]	Screening benchmark (pCi/g soil)[i]
Actinium-227	2.62E-21	6.91E-02	1.56E-02	2.31E-04	1.00E+00	1.56E-02	4.25E-07	9.39E-10	1.11E-06	6.82E+01
Thorium-227 (98.62% of At-227)	2.65E-18	5.88E+00	5.30E-02	1.10E-01	1.00E-01	5.30E-03	1.72E-06	9.50E-07	3.19E-05	6.73E+01
Francium-223 (1.38% of At-227)	1.01E-18	0.00E+00	4.00E-01	5.90E-02	1.00E-01	4.00E-02	1.09E-05	3.62E-07	8.30E-07	9.41E-01
Radium-223 (100% of Th-227 and Fr-223)	3.1E-18	5.67E+00	7.60E-02	1.34E-01	1.10E-01	8.36E-03	2.43E-06	1.11E-06	4.85E-05	6.82E+01
Radon-219	1.54E-18	6.76E+00	6.30E-03	5.58E-02	1.10E-01	6.93E-04	3.34E-07	5.52E-07	4.79E-06	6.82E+01
Polonium-215	4.98E-21	7.39E+00	6.30E-06	1.76E-04	1.00E+00	6.30E-06	4.89E-09	1.78E-09	4.76E-08	6.82E+01
Lead-211	1.46E-18	0.00E+00	4.56E-01	5.10E-02	1.60E-01	7.30E-02	1.25E-05	5.23E-07	1.73E-06	6.82E+01
Bismuth-211	1.28E-18	6.55E+00	9.78E-03	4.66E-02	1.90E-01	1.86E-03	5.00E-07	4.59E-07	1.24E-05	6.82E+01
Thallium-207 (99.72% of Bi-211)	9.48E-20	0.00E+00	4.93E-01	2.21E-03	9.40E-01	4.63E-01	1.33E-05	3.40E-08	1.17E-05	6.80E+01
Polonium-211 (0.28% of Bi-211)	2.24E-19	7.44E+00	1.69E-04	7.79E-03	9.40E-01	1.59E-04	2.01E-07	8.03E-08	1.21E-06	1.90E-01
Americium-241	2.34E-19	5.48E+00	5.20E-02	3.30E-02	3.40E-01	1.77E-02	1.70E-06	8.39E-08	9.91E-05	9.92E+01
Lead-210	1.31E-20	0.00E+00	3.80E-02	4.81E-03	9.40E-01	3.57E-02	1.14E-06	4.70E-09	7.76E-08	8.62E+02
Bismuth-210	1.86E-20	0.00E+00	3.89E-01	0.00E+00	0.00E+00	0.00E+00	1.04E-05	6.67E-09	0.00E+00	8.62E+02
Protactinium-231	9.62E-19	4.97E+00	6.50E-02	4.76E-02	1.80E-01	1.17E-02	1.97E-06	3.45E-07	5.95E-05	1.62E+02
Radium-226	1.65E-19	4.77E+00	3.59E-03	6.74E-03	9.40E-01	3.37E-03	2.66E-07	5.91E-08	1.65E-05	1.50E+02
Radon-222	1.1E-20	5.49E+00	1.09E-05	3.98E-04	1.00E+00	1.09E-05	1.10E-08	3.94E-09	6.11E-08	1.50E+02
Polonium-218	2.63E-22	6.00E+00	1.42E-05	9.12E-06	1.00E+00	1.42E-05	6.26E-10	9.43E-11	8.71E-08	1.50E+02
Lead-214 (99.98% of Po-218)	6.7E-18	0.00E+00	2.93E-01	2.50E-01	9.00E-02	2.64E-02	8.46E-06	2.40E-06	4.25E-07	1.50E+02
Astatine-218 (0.02% of Po-218)	3.13E-20	6.70E+00	4.00E-02	6.72E-03	9.40E-01	3.76E-02	1.24E-06	1.12E-08	2.57E-04	3.00E-02
Bismuth-214 (100% of Pb-214 and At-218)	4.36E-17	0.00E+00	6.59E-01	1.51E+00	8.00E-02	5.27E-02	2.09E-05	1.56E-05	2.10E-06	1.50E+02
Polonium-214	2.4E-21	7.69E+00	8.19E-07	8.33E-05	1.00E+00	8.19E-07	2.26E-09	8.60E-10	6.43E-09	1.50E+02
Thorium-228	4.17E-20	5.40E+00	2.10E-02	3.00E-03	9.40E-01	1.97E-02	6.39E-07	1.49E-08	1.09E-04	3.70E+01
Radium-224	2.62E-19	5.67E+00	2.00E-03	1.00E-02	9.40E-01	1.88E-03	3.06E-07	9.39E-08	1.09E-05	3.70E+01
Radon-220	1.1E-20	6.29E+00	8.91E-06	3.85E-04	1.00E+00	8.91E-06	1.06E-08	3.94E-09	5.73E-08	3.70E+01
Polonium-216	4.87E-22	6.79E+00	1.61E-07	1.69E-05	1.00E+00	1.61E-07	4.58E-10	1.75E-10	1.12E-09	3.70E+01
Lead-212	3.62E-18	0.00E+00	1.76E-01	1.48E-01	1.00E-01	1.76E-02	5.12E-06	1.30E-06	1.72E-07	3.70E+01
Bismuth-212	5.36E-18	2.17E+00	4.72E-01	1.86E-01	1.00E-01	4.72E-02	1.32E-05	1.92E-06	1.06E-04	3.70E+01
Polonium-212 (64.07% of Bi-212)	0.00E+00	8.79E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E+01
Thallium-208 (35.93% of Bi-212)	9.68E-17	0.00E+00	5.98E-01	3.38E+00	8.00E-02	4.78E-02	2.33E-05	3.47E-05	2.12E-06	1.33E+01
Thorium-230	6.39E-21	4.67E+00	1.46E-02	1.55E-03	9.40E-01	1.37E-02	4.31E-07	2.29E-09	6.55E-05	1.52E+02
Thorium-232	2.78E-21	4.00E+00	1.20E-02	1.33E-03	9.40E-01	1.13E-02	3.55E-07	9.96E-10	4.61E-05	1.35E+02
Radium-228	0.00E+00	0.00E+00	1.69E-02	4.14E-09	1.00E+00	1.69E-02	4.53E-07	0.00E+00	1.46E-08	1.35E+02
Actinium-228	2.76E-17	0.00E+00	4.75E-01	9.71E-01	1.10E-01	5.23E-02	1.56E-05	9.89E-06	1.55E-06	1.35E+02
Uranium-234	2.14E-21	4.76E+00	1.30E-02	1.73E-03	9.40E-01	1.22E-02	3.92E-07	7.67E-10	5.94E-05	1.67E+02
Uranium-235	3.75E-18	4.40E+00	4.90E-02	1.56E-01	1.00E-01	4.90E-03	1.73E-06	1.34E-06	2.20E-05	3.32E+02
Thorium-231	1.94E-19	0.00E+00	1.65E-01	2.60E-02	4.50E-01	7.43E-02	4.74E-06	6.95E-08	6.70E-07	3.32E+02

Table 6.19. Soil Benchmarks for Exposure of Small Mammals to Radiological COPCs and Decay Products

Radionuclide (parent and decay products)[a]	Dose Conversion Factor[b]	Alpha energy[c]	Beta energy[c]	Gamma energy[c]	Gamma absorption[d]	Uptake factor[e]	Subsurface exposure[f]	Surface exposure[g]	Internal exposure[h]	Screening benchmark (pCi/g soil)[i]
Uranium-238	5.52E-22	4.19E+00	1.00E-02	1.36E-03	9.40E-01	9.40E-03	3.03E-07	1.98E-10	4.02E-05	1.04E+02
Thorium-234	1.29E-19	0.00E+00	5.92E-02	9.34E-03	9.40E-01	5.56E-02	1.82E-06	4.62E-08	1.93E-07	1.04E+02
Protactinium-234m	4.2E-19	0.00E+00	8.22E-01	1.20E-02	8.80E-01	7.23E-01	2.23E-05	1.51E-07	3.08E-05	1.04E+02
Protactinium-234	5.38E-17	0.00E+00	4.94E-01	1.92E+00	8.00E-02	3.95E-02	1.74E-05	1.93E-05	1.31E-06	2.63E+02

[a] Decay products are indented from their parents

[b] Dose conversion factors from Eckerman and Ryman (1993)

[c] Decay energies (meV per disintegration) from Eckerman and Ryman (1993)

[d] Gamma absorption factors from Blaylock et al. (1993)

[e] Bioaccumulation factors from Table Rad1

[f] Subsurface exposure = 1.05 x $f_{belowground}$ x 0.0000511 x (Beta energy + Gamma energy x Gamma absorption).
$f_{belowground}$ = 0.5 = fraction of time animal is assumed to spend belowground.

[g] Surface exposure = $f_{aboveground}$ x 0.7 x 5.12 x 10^{11} x DCF x 2.
.$f_{aboveground}$ = 0.5 = fraction of time animal is assumed to spend on ground surface.

[h] Internal exposure = 0.0000511 x Uptake factor x (20 x Alpha energy + Beta energy + Gamma energy x Gamma absorption).

[i] Benchmark = activity (pCi/g) resulting in dose of 0.01 rad/d assuming secular equilibrium of parent and daughter products.

Fraction of time below surface	0.5
Fraction of time on surface	0.5

Table 6.20. Soil Benchmarks for Exposure of Birds to Radiological COPCs and Decay Products

Radionuclide (parent and decay products)[a]	Dose Conversion Factor[b]	Alpha energy[c]	Beta energy[c]	Gamma energy[c]	Gamma absorption[d]	Uptake factor[e]	Subsurface exposure[f]	Surface exposure[g]	Internal exposure[h]	Screening benchmark (pCi/g soil)[i]
Actinium-227	2.62E-21	6.91E-02	1.56E-02	2.31E-04	1.00E+00	1.56E-02	0.00E+00	9.39E-10	1.11E-06	8.67E+01
Thorium-227 (98.62% of At-227)	2.65E-18	5.88E+00	5.30E-02	1.10E-01	1.00E-01	5.30E-03	0.00E+00	9.50E-07	3.19E-05	8.55E+01
Francium-223 (1.38% of At-227)	1.01E-18	0.00E+00	4.00E-01	5.90E-02	1.00E-01	4.00E-02	0.00E+00	3.62E-07	8.30E-07	1.20E+00
Radium-223 (100% of Th-227 and Fr-223)	3.1E-18	5.67E+00	7.60E-02	1.34E-01	1.10E-01	8.36E-03	0.00E+00	1.11E-06	4.85E-05	8.67E+01
Radon-219	1.54E-18	6.76E+00	6.30E-03	5.58E-02	1.10E-01	6.93E-04	0.00E+00	5.52E-07	4.79E-06	8.67E+01
Polonium-215	4.98E-21	7.39E+00	6.30E-06	1.76E-04	1.00E+00	6.30E-06	0.00E+00	1.78E-09	4.76E-08	8.67E+01
Lead-211	1.46E-18	0.00E+00	4.56E-01	5.10E-02	1.60E-01	7.30E-02	0.00E+00	5.23E-07	1.73E-06	8.67E+01
Bismuth-211	1.28E-18	6.55E+00	9.78E-03	4.66E-02	1.90E-01	1.86E-03	0.00E+00	4.59E-07	1.24E-05	8.67E+01
Thallium-207 (99.72% of Bi-211)	9.48E-20	0.00E+00	4.93E-01	2.21E-03	9.40E-01	4.63E-01	0.00E+00	3.40E-08	1.17E-05	8.64E+01
Polonium-211 (0.28% of Bi-211)	2.24E-19	7.44E+00	1.69E-04	7.79E-03	9.40E-01	1.59E-04	0.00E+00	8.03E-08	1.21E-06	2.42E-01
Americium-241	2.34E-19	5.48E+00	5.20E-02	3.30E-02	3.40E-01	1.77E-02	0.00E+00	8.39E-08	9.91E-05	1.01E+02
Lead-210	1.31E-20	0.00E+00	3.80E-02	4.81E-03	9.40E-01	3.57E-02	0.00E+00	4.70E-09	7.76E-08	1.28E+03
Bismuth-210	1.86E-20	0.00E+00	3.89E-01	0.00E+00	1.00E+00	3.89E-01	0.00E+00	6.67E-09	7.73E-06	1.28E+03
Protactinium-231	9.62E-19	4.97E+00	6.50E-02	4.76E-02	1.80E-01	1.17E-02	0.00E+00	3.45E-07	5.95E-05	1.67E+02
Radium-226	1.65E-19	4.77E+00	3.59E-03	6.74E-03	9.40E-01	3.37E-03	0.00E+00	5.91E-08	1.65E-05	2.70E+02
Radon-222	1.1E-20	5.49E+00	1.09E-05	3.98E-04	1.00E+00	1.09E-05	0.00E+00	3.94E-09	6.11E-08	2.70E+02
Polonium-218	2.63E-22	6.00E+00	1.42E-05	9.12E-06	1.00E+00	1.42E-05	0.00E+00	9.43E-11	8.71E-08	2.70E+02
Lead-214 (99.98% of Po-218)	6.7E-18	0.00E+00	2.93E-01	2.50E-01	9.00E-02	2.64E-02	0.00E+00	2.40E-06	4.25E-07	2.70E+02
Astatine-218 (0.02% of Po-218)	3.13E-20	6.70E+00	4.00E-02	6.72E-03	9.40E-01	3.76E-02	0.00E+00	1.12E-08	2.57E-04	5.40E-02
Bismuth-214 (100% of Pb-214 and At-218)	4.36E-17	0.00E+00	6.59E-01	1.51E+00	8.00E-02	5.27E-02	0.00E+00	1.56E-05	2.10E-06	2.70E+02
Polonium-214	2.4E-21	7.69E+00	8.19E-07	8.33E-05	1.00E+00	8.19E-07	0.00E+00	8.60E-10	6.43E-09	2.70E+02
Thorium-228	4.17E-20	5.40E+00	2.10E-02	3.00E-03	9.40E-01	1.97E-02	0.00E+00	1.49E-08	1.09E-04	4.12E+01
Radium-224	2.62E-19	5.67E+00	2.00E-03	1.00E-02	9.40E-01	1.88E-03	0.00E+00	9.39E-08	1.09E-05	4.12E+01
Radon-220	1.1E-20	6.29E+00	8.91E-06	3.85E-04	1.00E+00	8.91E-06	0.00E+00	3.94E-09	5.73E-08	4.12E+01
Polonium-216	4.87E-22	6.79E+00	1.61E-07	1.69E-05	1.00E+00	1.61E-07	0.00E+00	1.75E-10	1.12E-09	4.12E+01
Lead-212	3.62E-18	0.00E+00	1.76E-01	1.48E-01	1.00E-01	1.76E-02	0.00E+00	1.30E-06	1.72E-07	4.12E+01
Bismuth-212	5.36E-18	2.17E+00	4.72E-01	1.86E-01	1.00E-01	4.72E-02	0.00E+00	1.92E-06	1.06E-04	4.12E+01
Polonium-212 (64.07% of Bi-212)	0.00E+00	8.79E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E+01
Thallium-208 (35.93% of Bi-212)	9.68E-17	0.00E+00	5.98E-01	3.38E+00	8.00E-02	4.78E-02	0.00E+00	3.47E-05	2.12E-06	1.48E+01
Thorium-230	6.39E-21	4.67E+00	1.46E-02	1.55E-03	9.40E-01	1.37E-02	0.00E+00	2.29E-09	6.55E-05	1.53E+02
Thorium-232	2.78E-21	4.00E+00	1.20E-02	1.33E-03	9.40E-01	1.13E-02	0.00E+00	9.96E-10	4.61E-05	1.74E+02
Radium-228	0.00E+00	0.00E+00	1.69E-02	4.14E-09	1.00E+00	1.69E-02	0.00E+00	0.00E+00	1.46E-08	1.74E+02
Actinium-228	2.76E-17	0.00E+00	4.75E-01	9.71E-01	1.10E-01	5.23E-02	0.00E+00	9.89E-06	1.55E-06	1.74E+02
Uranium-234	2.14E-21	4.76E+00	1.30E-02	1.73E-03	9.40E-01	1.22E-02	0.00E+00	7.67E-10	5.94E-05	1.68E+02
Uranium-235	3.75E-18	4.40E+00	4.90E-02	1.56E-01	1.00E-01	4.90E-03	0.00E+00	1.34E-06	2.20E-05	4.15E+02
Thorium-231	1.94E-19	0.00E+00	1.65E-01	2.60E-02	4.50E-01	7.43E-02	0.00E+00	6.95E-08	6.70E-07	4.15E+02

Table 6.20. Soil Benchmarks for Exposure of Birds to Radiological COPCs and Decay Products

Radionuclide (parent and decay products)[a]	Dose Conversion Factor[b]	Alpha energy[c]	Beta energy[c]	Gamma energy[c]	Gamma absorption[d]	Uptake factor[e]	Subsurface exposure[f]	Surface exposure[g]	Internal exposure[h]	Screening benchmark (pCi/g soil)[i]
Uranium-238	5.52E-22	4.19E+00	1.00E-02	1.36E-03	9.40E-01	9.40E-03	0.00E+00	1.98E-10	4.02E-05	1.40E+02
Thorium-234	1.29E-19	0.00E+00	5.92E-02	9.34E-03	9.40E-01	5.56E-02	0.00E+00	4.62E-08	1.93E-07	1.40E+02
Protactinium-234m	4.2E-19	0.00E+00	8.22E-01	1.20E-02	8.80E-01	7.23E-01	0.00E+00	1.51E-07	3.08E-05	1.40E+02
Protactinium-234	5.38E-17	0.00E+00	4.94E-01	1.92E+00	8.00E-02	3.95E-02	0.00E+00	1.93E-05	1.31E-06	4.86E+02

[a] Decay products are indented from their parents

[b] Dose conversion factors from Eckerman and Ryman (1993)

[c] Decay energies (meV per disintegration) from Eckerman and Ryman (1993)

[d] Gamma absorption factors from Blaylock et al. (1993)

[e] Bioaccumulation factors from Table Rad1

[f] Subsurface exposure = 1.05 x $f_{belowground}$ x 0.0000511 x (Beta energy + Gamma energy x Gamma absorption).

$f_{belowground}$ = 0 = fraction of time animal is assumed to spend belowground.

[g] Surface exposure = $f_{aboveground}$ x 0.7 x 5.12 x 10^{11} x DCF x 2.

$f_{aboveground}$ = 0.5 = fraction of time animal is assumed to spend on ground surface.

[h] Internal exposure = 0.0000511 x Uptake factor x (20 x Alpha energy + Beta energy + Gamma energy x Gamma absorption).

[i] Benchmark = activity (pCi/g) resulting in dose of 0.01 rad/d assuming secular equilibrium of parent and daughter products.

Fraction of time below surface	0
Fraction of time on surface	0.5

Table 6.21 Comparison of EPCs of Radiological COPCs to Soil Screening Benchmarks for Exposure of Soil Invertebrates

Medium	CAS Registry Number	Radionuclide	Screening Benchmark	EPC (pCi/g) EU1	EU2	EU3	EU4	EU5	EU6	EU7	EU8
Soil 0-10 ft	14952-40-0	Actinium-227	252	--	0.32	0.62	--	0.32	2.05	--	--
Soil 0-10 ft	14596-10-2	Americium-241	991	--	--	--	--	--	0.32	--	--
Soil 0-10 ft	14255-04-0	Lead-210	4,253	--	0.85	38.55	--	--	75.91	--	--
Soil 0-10 ft	13982-63-3	Radium-226	203	30.55	3.8	18.95	7.62	4.55	124.05	1.22	14.25
Soil 0-10 ft	15262-20-1	Radium-228	1,879	0.14	--	--	--	--	0.19	--	0.08
Soil 0-10 ft	14274-82-9	Thorium-228	156	0.66	--	--	--	--	0.42	--	0.72
Soil 0-10 ft	14269-63-7	Thorium-230	4,047	17.05	9.02	26.85	9.85	8.85	100.55	--	13.25
Soil 0-10 ft	7440-29-1	Thorium-232	1,880	0.68	--	--	--	--	0.98	--	2.24
Soil 0-10 ft	13966-29-5	Uranium-234	2,025	33.81	7.04	80.41	3.92	2.42	42.61	--	8.35
Soil 0-10 ft	15117-96-1	Uranium-235	1,764	0.78	0.48	2.77	0.26	0.49	4.59	--	0.98
Soil 0-10 ft	24678-82-8	Uranium-238	1,070	11.31	2.36	19.71	1.65	3.32	18.61	--	4.86
Soil 0-2 ft	14952-40-0	Actinium-227	252	--	0.51	1.07	--	0.54	2.5	--	--
Soil 0-2 ft	14596-10-2	Americium-241	991	--	--	--	--	--	0.32	--	--
Soil 0-2 ft	14255-04-0	Lead-210	4,253	--	0.85	38.55	--	--	75.91	--	--
Soil 0-2 ft	14331-85-2	Protactinium-231	388	--	--	0.97	--	--	--	--	--
Soil 0-2 ft	13982-63-3	Radium-226	203	57.95	9.65	26.65	11.75	14.05	87.55	--	74.83
Soil 0-2 ft	15262-20-1	Radium-228	1,879	0.1	--	--	-0.2	0.14	0.19	--	0.06
Soil 0-2 ft	14274-82-9	Thorium-228	156	1.09	--	--	0.48	1.1	0.81	--	0.72
Soil 0-2 ft	14269-63-7	Thorium-230	4,047	35.95	9.02	39.55	16.85	12.05	194.55	--	66.85
Soil 0-2 ft	7440-29-1	Thorium-232	1,880	1.29	--	--	0.48	0.62	0.97	--	4.3
Soil 0-2 ft	13966-29-5	Uranium-234	2,025	38.91	7.04	362.71	3.92	2.42	42.61	--	19.91
Soil 0-2 ft	15117-96-1	Uranium-235	1,764	1.39	0.8	3.24	0.46	0.78	3.83	--	1.19
Soil 0-2 ft	24678-82-8	Uranium-238	1,070	13.71	3.6	27.71	2.13	4.97	31.41	--	11.11

-- = Not a COPC at this EU

Table 6.22 Comparison of EPCs of Radiological COPCs to Soil Screening Benchmarks for Exposure of Small Mammals

Medium	CAS Registry Number	Radionuclide	Screening Benchmark	EPC (pCi/g)							
				EU1	EU2	EU3	EU4	EU5	EU6	EU7	EU8
Soil 0-10 ft	14952-40-0	Actinium-227	68	--	0.32	0.62		0.32	2.05	--	--
Soil 0-10 ft	14596-10-2	Americium-241	99	--	--	--	--	--	0.32	--	--
Soil 0-10 ft	14255-04-0	Lead-210	862	--	0.85	38.55	--	--	75.91	--	--
Soil 0-10 ft	13982-63-3	Radium-226	150	30.55	3.8	18.95	7.62	4.55	124.05	1.22	14.25
Soil 0-10 ft	15262-20-1	Radium-228	135	0.14	--	--	--	--	0.19	--	0.08
Soil 0-10 ft	14274-82-9	Thorium-228	37	0.66	--	--	--	--	0.42	--	0.72
Soil 0-10 ft	14269-63-7	Thorium-230	152	17.05	9.02	26.85	9.85	8.85	100.55	--	13.25
Soil 0-10 ft	7440-29-1	Thorium-232	135	0.68	--	--	--	--	0.98	--	2.24
Soil 0-10 ft	13966-29-5	Uranium-234	167	33.81	7.04	80.41	3.92	2.42	42.61	--	8.35
Soil 0-10 ft	15117-96-1	Uranium-235	332	0.78	0.48	2.77	0.26	0.49	4.59	--	0.98
Soil 0-10 ft	24678-82-8	Uranium-238	104	11.31	2.36	19.71	1.65	3.32	18.61	--	4.86
Soil 0-2 ft	14952-40-0	Actinium-227	68	--	0.51	1.07	--	0.54	2.5	--	--
Soil 0-2 ft	14596-10-2	Americium-241	99	--	--	--	--	--	0.32	--	--
Soil 0-2 ft	14255-04-0	Lead-210	862	--	0.85	38.55	--	--	75.91	--	--
Soil 0-2 ft	14331-85-2	Protactinium-231	162	--	--	0.97	--	--	--	--	--
Soil 0-2 ft	13982-63-3	Radium-226	150	57.95	9.65	26.65	11.75	14.05	87.55	--	74.83
Soil 0-2 ft	15262-20-1	Radium-228	135	0.1	--	--	-0.2	0.14	0.19	--	0.06
Soil 0-2 ft	14274-82-9	Thorium-228	37	1.09	--	--	0.48	1.1	0.81	--	0.72
Soil 0-2 ft	14269-63-7	Thorium-230	152	35.95	9.02	39.55	16.85	12.05	194.55	--	66.85
Soil 0-2 ft	7440-29-1	Thorium-232	135	1.29	--	--	0.48	0.62	0.97	--	4.3
Soil 0-2 ft	13966-29-5	Uranium-234	167	38.91	7.04	362.71	3.92	2.42	42.61	--	19.91
Soil 0-2 ft	15117-96-1	Uranium-235	332	1.39	0.8	3.24	0.46	0.78	3.83	--	1.19
Soil 0-2 ft	24678-82-8	Uranium-238	104	13.71	3.6	27.71	2.13	4.97	31.41	--	11.11

-- = Not a COPC at this EU

Table 6.23 Comparison of EPCs of Radiological COPCs to Soil Screening Benchmarks for Exposure of Terrestrial Birds

Medium	CAS Registry Number	Radionuclide	Screening Benchmark	EPC (pCi/g) EU1	EU2	EU3	EU4	EU5	EU6	EU7	EU8
Soil 0-10 ft	14952-40-0	Actinium-227	87	--	0.32	0.62	--	0.32	2.05	--	--
Soil 0-10 ft	14596-10-2	Americium-241	101	--	--	--	--	--	0.32	--	--
Soil 0-10 ft	14255-04-0	Lead-210	1,279	--	0.85	38.55	--	--	75.91	--	--
Soil 0-10 ft	13982-63-3	Radium-226	270	30.55	3.8	18.95	7.62	4.55	124.05	1.22	14.25
Soil 0-10 ft	15262-20-1	Radium-228	174	0.14	--	--	--	--	0.19	--	0.08
Soil 0-10 ft	14274-82-9	Thorium-228	87	0.66	--	--	--	--	0.42	--	0.72
Soil 0-10 ft	14269-63-7	Thorium-230	153	17.05	9.02	26.85	9.85	8.85	100.55	--	13.25
Soil 0-10 ft	7440-29-1	Thorium-232	174	0.68	--	--	--	--	0.98	--	2.24
Soil 0-10 ft	13966-29-5	Uranium-234	168	33.81	7.04	80.41	3.92	2.42	42.61	--	8.35
Soil 0-10 ft	15117-96-1	Uranium-235	415	0.78	0.48	2.77	0.26	0.49	4.59	--	0.98
Soil 0-10 ft	24678-82-8	Uranium-238	140	11.31	2.36	19.71	1.65	3.32	18.61	--	4.86
Soil 0-2 ft	14952-40-0	Actinium-227	87	--	0.51	1.07	--	0.54	2.5	--	--
Soil 0-2 ft	14596-10-2	Americium-241	101	--	--	--	--	--	0.32	--	--
Soil 0-2 ft	14255-04-0	Lead-210	1,279	--	0.85	38.55	--	--	75.91	--	--
Soil 0-2 ft	14331-85-2	Protactinium-231	167	--	--	0.97	--	--		--	--
Soil 0-2 ft	13982-63-3	Radium-226	270	57.95	9.65	26.65	11.75	14.05	87.55	--	74.83
Soil 0-2 ft	15262-20-1	Radium-228	174	0.1	--	--	-0.2	0.14	0.19	--	0.06
Soil 0-2 ft	14274-82-9	Thorium-228	87	1.09	--	--	0.48	1.1	0.81	--	0.72
Soil 0-2 ft	14269-63-7	Thorium-230	153	35.95	9.02	39.55	16.85	12.05	194.55	--	66.85
Soil 0-2 ft	7440-29-1	Thorium-232	174	1.29	--	--	0.48	0.62	0.97	--	4.3
Soil 0-2 ft	13966-29-5	Uranium-234	168	38.91	7.04	362.71	3.92	2.42	42.61	--	19.91
Soil 0-2 ft	15117-96-1	Uranium-235	415	1.39	0.8	3.24	0.46	0.78	3.83	--	1.19
Soil 0-2 ft	24678-82-8	Uranium-238	140	13.71	3.6	27.71	2.13	4.97	31.41	--	11.11

-- = Not a COPC at this EU

Table 6.24 Synopsis of Habitats at Painesville

Exposure Unit (EU)-Area	Size		Cover
	Meter^2	Hectare	
EU 1-Area A	2489	0.2489	grass and asphalt
EU 2-Area B	930	0.93	all grass
EU 3-Area C	1357	0.1357	gravel and short grass
EU 4-Area D	403	0.0403	asphalt and some gravel
EU 5-Area G	121	0.0121	gravel and few plants
EU 6-Area I	533	0.0533	old field, high vegetation
EU 7-Post 1950 Structure	960	0.096	building foundations and grass
EU 8-Rubble Pile	281	0.0281	rubble and sparse weeds

Table 7.1. Painesville Radionuclide Constituents of Concern by Medium and Receptor *

Receptor	Medium	
	Surface Soil (0-2 feet)	Total Soil (0-10 feet)
Industrial Worker	Ac-227 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-235	
Resident		Ac-227 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-235 U-234 U-238
Subsistence Farmer		Ac-227 Pb-210 Ra-226 Ra-228 Th-228 Th-230 Th-232 U-235 U-238
* Any radionuclide producing an estimated all-pathway radiological risk of 1.0×10^{-6} or larger.		

Table 7.2 Insitu Remediation Volumes for a 25 mrem/yr dose.

Area	Volume (yd^3)	
	Subsistence Farmer	Industrial
Area A	1920	540
Area B	600	10
Area C	890	100
Area D	160	10
Area G	40	10
Area I	310	30
Rubble Pile	140	30
Total	4060	730

Table 7.3. Remedial Action Objectives for the Painesville Site

Receptor	Medium (units)	Radionuclide	Action Level and Basis OAC 3701-1-38 [a,c]
Industrial Worker	Surface Soil (pCi/g)	Ac-227	53
		Pb-210	660
		Ra-226[d]	15
		Ra-228	24
		Th-228	20
		Th-230[b]	43
		Th-232	11
		Total U	1500
Resident	Total Soil (pCi/g)	Ac-227	21
		Pb-210	110
		Ra-226[d]	8.3
		Ra-228	13
		Th-228	11
		Th-230[b]	22
		Th-232	5.7
		Total U	710
Subsistence Farmer	Total Soil (pCi/g)	Ac-227	6.8
		Pb-210	6.2
		Ra-226[d]	2.0
		Ra-228	3.9
		Th-228	6.1
		Th-230[b]	5.9
		Th-232	2.3
		Total U	260

All values rounded to two significant digits.

[a] Concentration corresponding to 25 mrem/yr

[b] Value conservatively represents Th-230 limit for year 1,000 allowing ingrowth of Ra-226

[c] Values listed under 10 CFR 20 are annual doses.

[d] Ra-226 criteria includes Pb-210 contribution to dose.

FS Text

FINAL
FEASIBILITY STUDY

PAINESVILLE FUSRAP SITE
PAINESVILLE, OHIO

Prepared for:
U.S. Army Corps of Engineers
Buffalo District

Prepared by:
Science Applications International Corporation
4900 Blazer Parkway
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Contract: DAHA90-94-D-007

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF FS APPENDICES

Note: These Appendices are found on the CD in the pocket on the back cover of the document.

ACRONYMS, ABBREVIATIONS AND SYMBOLS

AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
ARARs	Applicable or Relevant and Appropriate Requirements
BRA	Baseline Risk Assessment
CBC	circulating bed combustor
CEC	Cation Exchange Capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COCs	Constituents of Concern
DOE	Department of Energy
DRE	destruction removal efficiency
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ER	electrokinetic remediation
EU	Exposure unit
FS	Feasibility Study
FUSRAP	Formerly Utilized Sites Remedial Action Program
GRA	General Response Action
HCl	Hydrochloric Acid
IA	Investigative Areas
IC	Institutional Controls
ISV	In situ vitrification
MCL	maximum contaminant level
MED/AEC	Manhattan Engineering District/Atomic Energy Commission
mrem/yr	millirem per year
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOx	Nitrogen Oxide
NRC	Nuclear Regulatory Commission
O&M	Operation and Maintenance
OAC	Ohio Administrative Code
Ohio EPA	Ohio Environmental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
Pb-210	Lead-210
PCB	Polychlorinated biphenyls
PCP	pentachlorophenol
pCi/g	picocuries per gram
PP	Proposed Plan
PRG	Preliminary Remediation Goal
RA	Remedial Action
Ra-226	Radium-226
Ra-228	Radium-228
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
Redox	Reduction/oxidation
RESRAD	Residual Radiation
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision

ACRONYMS, ABBREVIATIONS, AND SYMBOLS (Continued)

S/S	Solidification/Stabilization
SOR	Sum of Ratios
Sox	Sulfur oxides
SVE	Soil Vapor Extraction
SVOC	Semivolatile Organic Compound
TBC	To Be Considered
TEDE	Total Effective Dose Equivalent
Th-228	Thorium-228
Th-230	Thorium 230
Th-232	Thorium-232
U-235	Uranium-235
U-238	Uranium-238
UCC	Uniroyal Chemical Company
USACE	United States Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
yd^3	cubic yards

EXECUTIVE SUMMARY

The United States Army Corps of Engineers (USACE), as the lead federal agency for the remediation of the Painesville site, is required by law to execute the Formerly Utilized Sites Remedial Action Program (FUSRAP) in accordance with the administrative, procedural and regulatory provisions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The feasibility study (FS) is performed to ensure appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy be selected. The FS process requires the development of alternatives, the screening of alternatives, and a detailed analysis and comparison of alternatives. Development of the alternatives must take into account the site specific conditions and factors. The NCP requires specific criteria be evaluated for the proposed alternatives. The alternatives must be protective of human health and the environment. USACE is also responsible for ensuring the selected remedy will be protective of human health and the environment and compliant with applicable or relevant and appropriate requirements (ARARs).

The remedial action objectives (RAOs) for the Painesville FS are as follows:

- To cost-effectively reduce the toxicity, mobility, and/or volume of site contaminants to levels which are protective of human health and the environment.
- To reduce exposure risks posed to human health and the environment through treatment of contaminated media or by providing an adequate physical barrier between the contaminated media and the receptor.
- To be protective of human health and the environment for the intended future land uses.

The identification and evaluation of ARARs is an integral part of the FS process. Part 121 of CERCLA specifies that remedial actions for cleanup of hazardous substances must comply with requirements or standards under Federal or more stringent state environmental laws that are applicable or relevant and appropriate to the hazardous substances or circumstances at a site. Protection of human health and the environment is assured by implementing ARARs.

USACE is proposing the selection of 10 Code of Federal Regulations (CFR) 20, Subpart E as an ARAR to address the radionuclide contamination in soil at the site. This requirement has been promulgated by the Nuclear Regulatory Commission (NRC) to ensure consistent standards for determining the extent to which lands must be remediated before decommissioning of a site can be considered complete and the NRC license terminated. The rule is applicable to NRC-licensed facilities. The Painesville site has no NRC license; therefore, the rule is not applicable but is considered relevant and appropriate.

10 CFR Part 20 Subpart E is both relevant and appropriate for use as a cleanup standard at the Painesville site. The rule addresses situations sufficiently similar to the circumstances of the release at Painesville and its use is appropriate to the circumstances of the release.

In addition, USACE is also proposing the selection of Ohio Administrative Code (OAC) 3701-1-38-22 as an ARAR to address the radionuclide contamination in soil at the site. The requirement has been promulgated by the State of Ohio, as an agreement state, to ensure consistent standards for determining the extent to which lands in the State of Ohio must be remediated before decommissioning of a site can be considered complete and the state license can be terminated. The regulation is more stringent than the Federal standard. The regulation is applicable to state-licensed facilities. The Painesville site has no state license; therefore, the regulation is not applicable but is relevant and appropriate. The regulation addresses situations sufficiently similar to the circumstances of the release at Painesville and its use is appropriate to the circumstances of the release.

In determining the potential remedial alternatives, the universe of technology types and process options that are potentially applicable for remediating the media of concern (i.e., soils) and the constituents of concern are identified. These are organized into general response actions including no action, limited actions, treatment, containment, removal, and disposal.

In the initial screening phase, the technology types and process options are evaluated on the basis of technical implementability. Technical implementability is determined based on the following criteria: site characteristics, contaminant characteristics, and technology development. Because an Engineering Evaluation/Cost Analysis (EE/CA) has already been developed for this site many technologies that were considered inappropriate were screened out at that time. Thus the list of technology types is a focused list.

Technology process options considered to be implementable are assessed in greater detail before selecting at least one process to represent each technology type. One representative process is selected, if possible, to facilitate the alternative development evaluation and provide a basis for developing preliminary designs.

The selected technology process options are subjected to a detailed screening using three major criteria: effectiveness, implementability, and cost. Of these criteria, effectiveness is the most important. Implementability and cost are factored into the assessment to determine the final screening decision as to whether the process option is retained. It is important to note that at this stage of the analysis these criteria are applied to the technologies within the general response actions they are intended to satisfy and not to the site as a whole.

Alternatives are developed using the technologies remaining after the detailed screening. Four alternatives are presented for remediation: no action (Alternative 1), capping (Alternative 2), excavation and disposal (Alternative 3), and limited excavation and disposal (Alternative 4).

Under the no action alternative, no additional remedial action would be taken at the Painesville site. The current and future land owners would continue to maintain the site controls to verify that no significant changes in site conditions occur.

The capping alternative combines the installation of an asphalt cap with land use controls and environmental monitoring. Impacted soil exceeding remedial action objectives would be covered in-place by a one-foot thick asphalt cap. Any regular capping material would suffice since the primary purpose is to block an exposure pathway. Asphalt has been selected as a representative and well understood technology.

The two excavation and disposal alternatives involve the excavation of impacted soil exceeding a sum of ratios (SOR) of 1, off-site transportation, and disposal of the soil at a commercial facility licensed and/or permitted to accept radiological waste. Excavated areas would be backfilled with clean soil, graded, and re-vegetated. The two alternatives differ in that one uses the SOR calculated based on a future subsistence farmer use for the site and the other uses a SOR based on a future industrial use. Following completion of the remedial action, the site would be released for unrestricted use for the subsistence farmer case and only for industrial use in the industrial case.

Section 300.430 (e) of the NCP lists nine criteria by which each remedial alternative must be assessed. The acceptability and performance of each alternative against the criteria is evaluated individually so that relative strengths and weaknesses may be identified. The criteria are: Overall Protection of Human Health and the Environment, Compliance with Applicable or Relevant and Appropriate Requirements, Long-term Effectiveness and Permanence, Reduction of Toxicity, Mobility, or Volume through Treatment, Short-term Effectiveness, Implementability, Cost, State Acceptance and Community Acceptance.

The following presents a brief discussion of the criteria indicating which alternative best satisfies that criteria. The criteria, State and Community Acceptance, will not be addressed in this analysis because they will be evaluated in the Record of Decision (ROD) once comments on the Remedial Investigation/Feasibility Study (RI/FS) report and Proposed Plan (PP) have been received. Table 7.1 presents a summary of the detailed analysis for each of the remedial alternatives.

Overall Protection of human health and the Environment: Alternative 3 provides the best protection of human health and the environment for the site because the impacted soil would be removed from its present location and transported to an off-site facility for disposal.

Compliance with ARARs: Alternative 3, Excavation and Off-site Disposal, will comply with ARARs as will Alternatives 2 and 4. Following completion of Alternative 3, the Painesville site would meet criteria for release without radiological restrictions.

Long-Term Effectiveness and Permanence: Among the three alternatives, the Excavation and Off-site Disposal alternative (Alternative 3) provides the best long-term effectiveness and permanence. Impacted soil exceeding a subsistence farmer land use SOR of 1 would be excavated and removed from the Painesville site. In addition, there would not be any post-remedial actions (i.e., monitoring and maintenance) or land-use restrictions associated with this alternative.

Reduction in Toxicity, Mobility, or Volume through Treatment: None of the alternatives reduce toxicity, mobility or volume through treatment.

Short-Term Effectiveness: Alternative 2, (Capping of Contaminated Soils In-place) requires minimal intrusive activities, therefore, no significant environmental risks to onsite workers, the community, and the environment are expected during the implementation of this alternative in the short-term. This alternative provides the greatest measure of short term effectiveness and generates the least short term risks.

With the exception of the long-term monitoring and maintenance component, all alternatives are anticipated to take less than one year in implementation time.

Implementability: Among the alternatives, Excavation and Off-site Disposal (Alternative 3) would be the easiest to implement both technically and administratively. This alternative requires the use of common equipment, materials, and supplies. Furthermore, long-term monitoring and maintenance would not be required following completion of this remedial action.

Cost: Alternative 4, Limited Excavation and Off-site Disposal, has the lowest estimated cost to complete.

1.0 INTRODUCTION

The United States Army Corps of Engineers (USACE) has been directed by Congress to execute the Formerly Utilized Sites Remedial Action Program (FUSRAP) in accordance with the terms of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The USACE is the lead agency for FUSRAP activities at the Painesville site.

The Feasibility Study (FS) is performed to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy be selected. The FS process requires the development of alternatives, the screening of alternatives and a detailed analysis of alternatives. Development of the alternatives must take into account the site specific conditions and factors. The NCP requires that specific criteria be evaluated for the proposed alternatives. The alternatives must be protective of human health and the environment. USACE is also responsible for ensuring the selected remedy will be protective of human health and the environment and in compliance with applicable or relevant and appropriate requirements (ARARs).

The Painesville FUSRAP Site was the subject of a Characterization Report and an Engineering Evaluation/Cost Analysis (EE/CA) in 1998. The 1998 studies led to the initiation of a Removal Action at the site in 1998. While performing the Removal Action, the contractor found more contamination present than had been expected from earlier investigations. Subsequent to that, Uniroyal Chemical Company decided to close its facility located on part of the Painesville FUSRAP Site. Findings from the 1998 excavation, the closing of the facility and the removal of the buildings have resulted in changed site conditions. These changed site conditions have occasioned this Focused Remedial Investigation/Feasibility Study (RI/FS). This RI/FS is intended to complete the characterization of the radiological constituents of the Painesville FUSRAP Site and to present and evaluate alternatives for remediation.

This focused Feasibility Study (FS) is a companion document to the focused Remedial Investigation (RI) conducted in 2000 at the Painesville FUSRAP Site. Both the RI and the FS documents are being issued at the same time.

An RI is conducted to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives. In the 2000 RI, the Painesville site was characterized in more detail than previously for the presence of radionuclide contaminants related to Manhattan Engineer District/Atomic Energy Commission (MED/AEC) activities conducted in the 1940s and 1950s. The 2003 RI Report concludes that the Painesville site continues to harbor three radionuclide contaminants in soil that pose a health risk. The three contaminants are Radium-226 (Ra-226), Thorium-230 (Th-230), and Uranium-238 (U-238). In addition, U-238 poses a kidney toxicity risk. The 2000 RI Report (preceding this document in this volume) concludes or affirms that groundwater, surface water, and sediments at the Painesville site do not contain unacceptable levels of the three contaminants of concern. This is based on the findings, of the 1996 characterization, that no radiological contamination was found in sediment or surface water above background and, the 2000 sampling, that all radionuclides in groundwater are well below maximum contaminant levels (MCLs).

The purpose of this Focused FS is to develop alternatives for remediating the radionuclide contamination remaining at the Painesville site to a level that no longer poses threats to human health or the environment. The main objective of an FS is to ensure that appropriate remedial alternatives are developed and evaluated in a way that adequately informs the decision-maker about remedial action options so an appropriate remedy can be selected.

Once developed, the remedial alternatives are evaluated in accordance with criteria specified in the NCP so that the most effective remedial alternative can be selected for the site. The two threshold NCP criteria are that an alternative must be protective of human health and the environment, and that it must comply with the ARARs.

Developing alternatives requires several steps. These are:

(1) identifying remedial action objectives;
(2) identifying potential treatment, resource recovery, and containment technologies that will satisfy these objectives;
(3) screening the technologies based on their effectiveness, implementability, and cost; and
(4) assembling technologies and their associated containment or disposal requirements into alternatives for the contaminated media at the site.

These steps are discussed in greater detail in the remainder of this FS.

2.0 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are statements that set forth a general description of what the remedial action will accomplish. RAOs should specify contaminants and media of concern, potential exposure pathways, and remediation goals. The first step in developing RAOs is to establish preliminary remediation goals (PRGs). PRGs are a subset of RAOs that set forth a more specific statement of the desired endpoint concentrations or risk levels. PRGs are initially based on readily-available information, such as chemical-specific ARARs or other reliable information. The USACE looked for location or action specific ARARs for radionuclides and did not find any. PRGs should be modified as necessary, as more information becomes available during the RI/FS. Final remediation goals will be determined when the remedy is selected.

This section describes the RAOs for soil at the Painesville site. In addition, this section discusses the ARARs, the PRGs, the general response actions (GRAs), the methodology used to estimate the volume of contaminated soil for remedial action, and soil volume estimates.

2.1 IDENTIFICATION OF REMEDIAL ACTION OBJECTIVES

The results of the remedial investigation indicate that localized areas of soil at the Painesville site are contaminated with Ra-226, U-238, and Th-230 at concentrations that present risk to current and potential future land users. The RAOs for the FS have been developed to specify the requirements that the remedial action alternatives must fulfill in order to protect human health and the environment from exposure to contaminants identified at the site. The RAOs for protecting human and ecological receptors will consider both the contaminant concentrations and the exposure routes since protectiveness may be achieved by reducing exposure as well as by reducing contaminant levels. The RAOs will also ensure that the planned remedial alternative does not significantly impact the local environment, as the use of heavy equipment can damage sensitive ecosystems.

The RAOs for the Painesville FS are as follows:

- To cost-effectively reduce the toxicity, mobility, and/or volume of site contaminants to levels which are protective of human health and the environment;
- To reduce exposure risks posed to human health and the environment through treatment of contaminated media or by providing an adequate physical barrier between the contaminated media and the receptor;
- To be protective of human health and the environment for the intended future land uses; and
- To comply with ARARs.

RAOs are applicable to all media that need to be addressed at the site. The 1996 field effort reported on in the 1998 Characterization Report (USACE, 1998) found no evidence of MED/AEC related contaminants in the sediments, surface water, or air of the Painesville site. These media are therefore not addressed in the FS. Groundwater was evaluated in the 2001 RI report and found to be currently unimpacted, and protected from migration of radionuclides by the nature and thickness of the soils at the site.

2.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The identification and evaluation of ARARs is an integral part of the FS process. Section 121 of CERCLA specifies that remedial actions for cleanup of hazardous substances must comply with requirements or standards under Federal or more stringent state environmental laws that are applicable or relevant and appropriate to the hazardous substances or circumstances at a site. Protection of human health and the environment is assured by complying with ARARs. The following sections discuss the ARARs for cleanup of the Painesville site.

2.2.1 Introduction to ARARs

Section 121(d)(1) of CERCLA sets requirements with respect to any hazardous substance, pollutant, or contaminant that will remain on-site. Remedial actions must upon completion achieve a level or standard of control which at least attains legally applicable or relevant and appropriate standards, requirements, criteria, or limitations (ARARs) under Federal environmental law or any more stringent state environmental or facility siting law. These standards apply unless such standard, requirement, criteria, or limitation is waived in accordance with Section 121(d)(4).

Identifying ARARs involves determining whether a requirement is applicable, and if it is not applicable, then whether a requirement is relevant and appropriate. Individual ARARs for each site must be identified on a site-specific basis. Factors to assist in identifying ARARs include the physical circumstances of the site, contaminants present, and characteristics of the remedial action.

Applicable requirements are defined as those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. A law or rule is applicable if the jurisdictional prerequisites of the law or rule are satisfied. These jurisdictional prerequisites are:

- Who, as specified by the statute or regulation, is subject to its authority;
- The types of substances or activities listed as falling under the authority of the statute or regulation;
- The time period for which the statute or regulation is in effect; and
- The type of activities the statute or regulation requires, limits, or prohibits.

State requirements are applicable if they are: (1) promulgated and of general applicability, (2) identified by the state in a timely manner, and (3) more stringent than federal standards.

Relevant and appropriate requirements are defined as those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site.

Determining whether a rule is relevant and appropriate is a two-step process which involves determining whether the rule is relevant, and, if so, whether it is appropriate. A requirement is relevant if it addresses problems or situations sufficiently similar to the circumstances of the remedial action contemplated. It is appropriate if it is well suited to the site.

In determining whether a requirement is both relevant and appropriate, the following factors may be used to evaluate a requirement.

- the purpose of the requirement;
- the physical characteristics (size/nature) of the site and contamination;
- the character and circumstances of the release at the site compared to what the requirement was intended to address and requires;
- the substances covered by the requirement (e.g., the chemical characteristics, form, or concentration of the contamination or release for which the requirement was designed);
- the duration of the activity; and
- the basis for a waiver or exemption.

A determination of relevance and appropriateness may be applied to only portions of a requirement, so that only parts of a requirement need be complied with, whereas a determination of applicability is made for the requirement as a whole, so that the entire requirement must be complied with.

CERCLA Section 121(e), 42 United States Code (USC) 9621(e), provides that no permit is required for the portion of any removal or remedial action conducted entirely onsite. Although no permit is required, onsite actions must comply with substantive requirements that permits enforce, but not with related administrative and procedural requirements. That is, remedial actions conducted onsite do not require a permit but must be conducted in a manner consistent with permitted conditions as if a permit were required.

A third category of standards, requirements, criteria or limitations is the "To Be Considered" (TBC) category, which includes proposed rules and non-promulgated advisories or guidance issued by federal or state government that are not legally binding and do not have the status of potential ARARs. If no other standard is available for a situation to help determine the necessary level of cleanup for protection of health or the environment, or if potential ARARs are determined not to be protective, a TBC can be included as guidance or justification for a standard used in the remediation.

ARARs may include as one of their provisions that the remediation be to a level As Low As Reasonably Achievable (ALARA). This provision may be satisfied by the conservative application of the ARAR limits and/or by designing the remediation to remove as much contaminated material as feasible consistent with good engineering and cost controls.

2.2.2 Identification of ARARs

Agencies responsible for remedial actions under CERCLA must ensure that selected remedies meet ARARs. That is, CERCLA cleanups must attain standards borrowed from other environmental programs when the standards are applicable or relevant and appropriate under the circumstances. Table 2.1 shows the potential ARARs for the Painesville site. The following regulations are being proposed by USACE as ARARs for the Painesville FUSRAP Site.

2.2.2.1 10 CFR 20 – Radionuclides in Soil

USACE is proposing the selection of 10 CFR 20, Subpart E as a relevant and appropriate requirement to address the radionuclide contamination in soil at the site. This requirement has been promulgated by the Nuclear Regulatory Commission (NRC) to ensure consistent standards for determining the extent to which lands must be remediated before decommissioning of a site can be considered complete and the NRC license terminated. The rule is applicable to NRC-licensed facilities. The Painesville site has no NRC license; therefore, the rule is not applicable but is relevant and appropriate.

The standard in the rule that is relevant and appropriate to the cleanup of radionuclide contaminated soil is:

- Unrestricted use: 25 mrem/y total effective dose equivalent (TEDE) and as low as reasonably achievable (ALARA),

The type of place regulated by the requirement is any facility licensed by NRC to manage special nuclear, source, or byproduct material, that is undergoing decontamination and decommissioning for release of the property for reuse. Radionuclide contamination at Painesville came from contaminated scrap metal sent to the site during Atomic Energy Commission (AEC) activities. This material could have been classified as byproduct material if it had originated at the facility after 1978. Evaluating this standard in accordance with the factors determining whether a rule is relevant and appropriate leads to the determination that 10 CFR Part 20 Subpart E, particularly 10 CFR 20.1402 is relevant and appropriate as a soil cleanup standard for the Painesville FUSRAP Site.

The constituents regulated by this requirement include radium, thorium and uranium. The substances to be addressed at the Painesville site are radium, thorium and uranium and their associated decay products. The type and size of facility regulated by 10 CFR Part 20 Subpart E encompasses the type and size of the Painesville facility. The rule addresses situations sufficiently similar to the circumstances of the release at Painesville and its use is appropriate to the circumstances of the release.

2.2.2.2 OAC 3701-1-38-22 – Unrestricted Release Criteria for Radionuclide Contaminated Sites

USACE is proposing the selection of OAC 3701-1-38 as an ARAR to address the radionuclide contamination in soil at the site. The requirement has been promulgated by the State of Ohio, as an agreement state, to ensure consistent standards for determining the extent to which lands in the State of Ohio must be remediated before decommissioning of a site can be considered complete and the state license can be terminated. OAC 3701-1-38 adopts the same required dose equivalent as 10 CFR 20. However, the dose must be for unrestricted use unless a license will remain in place and the critical group consistently used by Ohio is the subsistence farmer.

The regulation addresses situations sufficiently similar to the circumstances of the release at Painesville and its use is appropriate to the circumstances of the release.

2.3 DEVELOPMENT OF PRELIMINARY REMEDIATION GOALS

Since U.S. Environmental Protection Agency (EPA) Region 9 does not have PRGs for radionuclides, no PRGs were used in the risk assessment portion of the RI for screening. Action levels, which are radionuclide specific, meet the 25 millirem per year (mrem/year) ARAR, and include site specific information, were calculated in the RI. The individual radionuclide action levels based on subsistence farmer land use for the site are Ra-226 3.19 picoCuries per gram (pCi/g), Th-230 5.9 pCi/g and U-238 231 pCi/g. Section 6.6.5 in the RI portion of this report discusses the selection of RAOs for the Painesville FUSRAP Site.

Table 2.1. Potential Federal and State ARARs for the Painesville Site, Painesville, Ohio

Standard Requirement Criteria or Limitation	Description	Applicable, Relevant and Appropriate Requirement, or TBC
Federal Requirements		
NRC Radiological Criteria for License Termination: 10 CFR 20 Subpart E	This rule provides standards for determining the extent to which lands must be remediated before decommissioning of a site can be considered complete and the license terminated.	Relevant and Appropriate
State Requirements		
General Radiation Protection Standards for Sources of Radiation. OAC 3701-1-38.	Establishes standards for protection against ionizing radiation resulting from activities conducted under licenses issued by the state including decommissioning and license termination. Includes the 25 mrem/year dose limit equivalent to 10 CFR 20 Subpart E.	Relevant and Appropriate

3.0 GENERAL RESPONSE ACTIONS

The GRAs are broad categories of remedial approaches capable of satisfying the RAOs and dealing with the constituents of concern (COCs). The remedial goals and objectives are achieved by using one or a combination of the response actions. The RI has shown that the only media of concern is soil. The GRAs for the remediation of soil at the Painesville site are as follows:

- No Action
- Limited Actions
- Treatment
- Containment
- Removal
- Disposal

The area and volume of impacted soil, to which the GRAs will be applied, were determined using available site characterization data collected during the RI and previous environmental investigations. An estimate on the area and volume of soil requiring remedial action and the methodology used to calculate that estimate are provided in the following section.

3.1 SOIL VOLUME ESTIMATION

Calculation of the volume of remaining material that needs to be addressed by the FS was done using a Sum of ratios (SOR) guideline of 1 (25 mrem dose) for radiological COCs. The SOR for subsistence farmer use was calculated using the following formula:

SOR=Ac-227/6.8 + Ra-226 /2.0 + Ra-228 /3.9 + Th-228/6.1 + Th-230 /5.9 + Th-232/2.3 + (U-234 + U-235 + U-238)/260

Where: Ac-227, Ra-226, Th-230, and U-238 etc. are the activity-concentrations above background at each sample. The denominators of the equation are the individual action levels calculated by Residual Radiation model (RESRAD) to yield the 25 mrem/yr dose specified by the proposed ARAR. The Ra-226 guideline accounts for the dose from Pb-210 and is therefore lower than the individual isotope guideline.

The same formula substituting the industrial land use action levels (Ac-227= 52.7, Ra-226=15.0, Ra-228=23.7, Th-228=19.9, Th-230=43, Th-232=10.6, Total U=1500) for the denominators can be used to calculate the industrial land use SOR.

The 25 mrem dose limit is found in 10 CFR 20 and OAC 3701-1-38-22 which are proposed ARARs for the site. These regulations also include an ALARA provision. The individual concentrations of the three principle radionuclides that contribute 25 mrem were calculated using RESRAD and the subsistence farmer scenario used in the risk assessment (see Section 6.0 of the RI portion of this report). Data from the database were run through the SOR equation so that each sample with the appropriate analyses had an SOR value. This value along with location information was passed to the EarthVision software for 3 dimensional interpolation. The volume of material exceeding a subsistence farmer SOR of 1, for each investigative area, was calculated by EarthVision and is presented in Table 4.5 of the RI portion of the report. The volume was incorporated in the FS and the outline of each volume was projected to the surface for inclusion in the figures for Section 4.0 of the RI portion of this report. The outline of the industrial use SOR has also been included in the figures in Section 6 of the RI portion of this report.

4.0 IDENTIFICATION OF TECHNOLOGY TYPES AND PROCESS OPTIONS

In the following sections, the universe of technology types and process options that are potentially applicable for remediating the media of concern (i.e., soils) are identified. These are organized into GRAs including no action, limited actions, treatment, containment, removal, and disposal. Various sources were used to identify the technologies and process options, including references developed by the EPA, standard engineering texts, and on-line (i.e., internet) environmental databases.

4.1 NO ACTION

The NCP and CERCLA, as amended, require evaluation of the "no action" alternative as a basis for comparison with other remedial alternatives. The no action GRA consists of no remedial activities at the site. No technologies or process options are associated with this alternative. No action typically is considered in a FS to serve as a baseline consideration or to address sites that do not require active remediation.

4.2 LIMITED ACTIONS

This section describes the technology types and process options identified for the Limited Actions GRA.

4.2.1 Land Use Controls

Land use controls are any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent or reduce risks to human health and the environment. They may include the use of deed restrictions, and physical barriers (e.g., fencing). They require developing a land use controls implementation plan. Land use controls are not effective in reducing toxicity, mobility, or volume of COCs, but they may reduce the potential for exposure to impacted materials. The following sections discuss the specific process options associated with land use controls.

4.2.1.1 Legal Mechanisms

Legal mechanisms include restrictive covenants, equitable servitudes, and deed notices. The legal mechanisms used for land use controls are generally the same as those used for institutional controls (ICs) as discussed in the NCP. ICs are primarily legal mechanisms imposed to ensure that restrictions on land use developed as part of the remedy decision stay in place. The term land use controls includes institutional controls.

4.2.1.2 Administrative Mechanisms

Two types of administrative mechanisms can be placed on a property. The two categories of administrative mechanisms defined by EPA (EPA 2000) are:

- governmental controls (e.g., zoning, local permits, police power ordinances, groundwater use restrictions, condemnation of property)
- informational devices (e.g., state registry, advisories).

Governmental Controls: Controls using the regulatory authority of a governmental entity to impose restrictions on citizens or sites under its jurisdiction. Generally, state or local governments must establish controls of this type. However, the federal government does have the authority to condemn the property in order to gain the necessary property rights to implement land use controls

Informational Devices: Informational tools that provide information or notification that residual or capped contamination may remain on site. Common examples include registries of contaminated properties, and advisories.

4.2.1.3 Fencing

This process option involves the construction of security fencing where necessary to restrict access to soils with unacceptable constituent concentrations. Fencing materials may include steel fence posts, chain-link fencing up to 12 feet, and/or razor ribbon or barbed wire.

4.2.1.4 Land Use Controls Implementation Plan

This process option involves the implementation of a land use controls implementation plan to ensure the long-term effectiveness of a remedial response action.

4.2.2 Environmental Monitoring

Environmental monitoring may involve the implementation of a soil, air, groundwater, and/or surface water sampling and analysis program to track the effectiveness of a remedial response action, to further characterize the site before remediation, and/or determine if migration from the impacted area is occurring.

4.3 TREATMENT

This section describes the process options potentially applicable for treating contaminated soil. Those which are obviously not applicable to the contaminants at the Painesville FUSRAP site are noted. The formal screen is presented in Section 5.

4.3.1 In Situ Biological Treatment

In situ biological treatment consists of the in-place destruction or removal of soil contaminants through the stimulation of microorganisms or plants that use the contaminants as a food or energy source. Bioremediation generally consists of supplementing ambient levels of oxygen, nutrients, or moisture, under conditions of controlled temperature and pH. Bioremediation may be used for the remediation of petroleum hydrocarbons, solvents, pesticides, wood preservatives and other organic contaminants, and metals present in soil sludges or groundwater.

4.3.1.1 Phyto-Remediation

Phyto-remediation is an in situ remedial process that uses plants to remove, transfer, stabilize, and/or destroy contaminants in soil or sediment. Phyto-remediation may be used for the remediation of metals, pesticides, solvents, explosives, crude oil, polycyclic aromatic hydrocarbons (PAHs) or landfill leachate. The mechanisms of phyto-remediation include enhanced rhizosphere biodegradation, phyto-extraction (also called phyto-accumulation), phyto-degradation, and phyto-stabilization.

4.3.1.2 Enhanced Bioremediation

Enhanced bioremediation is an in situ remedial process in which indigenous or inoculated microorganisms (e.g., fungi, bacteria, and other microbes) degrade (metabolize) organic contaminants in soil and/or groundwater, converting them to innocuous end products. Nutrients, oxygen, or other amendments may be used to enhance bioremediation and contaminant desorption from subsurface materials. Enhanced bioremediation of soil typically involves the percolation or injection of groundwater or uncontaminated water mixed with nutrients and saturated with dissolved oxygen. Enhanced bioremediation is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.1.3 Bioventing

In bioventing, providing supplemental oxygen to existing soil microorganisms stimulates the natural, in situ biodegradation of aerobically degradable compounds. In contrast to soil vapor vacuum extraction, bioventing uses low airflow rates to provide only enough oxygen to sustain microbial activity. Oxygen is most commonly supplied through direct air injection into the contaminated soil. Bioventing techniques have been used successfully to remediate soils contaminated by petroleum hydrocarbons, nonchlorinated solvents, some pesticides, wood preservatives, and other organic chemicals (DOD 1996). Bioventing is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.1.4 Land Treatment

Land treatment is a bioremediation technology in which contaminated soils, sediments, or sludges are tilled into native soil and allowed to interact with native soil and the climate at the site. The waste, soil, climate, and biological activity interact dynamically as a system to degrade, transform, and immobilize waste constituents. Soil conditions often are controlled to optimize the rate of contaminant degradation. Land treatment systems require monitoring and environmental safeguards. Contaminants that have been successfully treated by land treatment include diesel fuel, fuel oils, oily sludge, wood-preserving wastes (pentachlorophenol, PAHs, and creosote), coke wastes, and certain pesticides (DOD 1996). Land treatment is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.2 In Situ Physical/Chemical Treatment

In situ physical/chemical treatment uses the properties of the contaminants or the contaminated medium to destroy (i.e., chemically convert), separate, or immobilize the contamination. For example, soil vapor extraction uses the volatility of a contaminant to separate it from the soil. Soil flushing uses the solubility of a contaminant in liquid to physically separate it from the soil. Surfactants may be added to the flushing solution to increase the solubility of a contaminant. Solidification/stabilization uses both physical and chemical means. Solidification encapsulates the contaminant, while stabilization physically alters or binds with the contaminant. The following sections discuss the specific process options for in situ physical/chemical treatment.

4.3.2.1 Electrokinetic Remediation or Separation

The electrokinetic remediation (ER) process removes metals and polar organic contaminants from low-permeability soil, mud, sludge, and marine dredging using electrochemical and electrokinetic processes. The process of ER applies a low-intensity direct current through soil between ceramic electrodes that are divided into a cathode array and an anode array. This mobilizes charged species, causing ions and water to move toward the electrodes. Metal ions, ammonium ions, and positively charged organic compounds move toward the cathode. Anions such as chloride, cyanide, fluoride, nitrate, and negatively charged organic compounds move toward the anode. The current creates an acid front at the anode and a base front at the cathode. In situ acidic conditions may help mobilize sorbed metal contaminants for transport to the collection system at the cathode.

Two approaches can be taken during ER: enhanced removal and treatment without removal. These approaches are discussed below:

- ***Enhanced Removal***—Enhanced removal is achieved by electrokinetic transport of contaminants toward the polarized electrodes to concentrate the contaminants for subsequent removal and ex situ treatment. Removal of contaminants at the electrode may be accomplished by several means such as: electroplating at the electrode, precipitation or co-precipitation at the electrode, pumping of water near the electrode, or complexing with ion exchange resins. Enhanced removal is widely used for remediation of soils contaminated with metals.

- ***Treatment without Removal***—Treatment without removal is achieved by electro-osmotic transport of contaminants through treatment zones between electrodes. The polarity of the electrodes is reversed periodically, which reverses the direction of the contaminants back and forth through treatment zones. The frequency with which electrode polarity is reversed is determined by the rate of transport of contaminants through the soil. This approach can be used for in situ remediation of soils contaminated with polar organic species and therefore is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.2.2 Solidification/Stabilization

Solidification/stabilization (S/S) reduces the mobility of hazardous substances and contaminants in the environment through both physical and chemical means. Unlike other remedial technologies, S/S seeks to trap or immobilize contaminants within their "host" medium (i.e., soil, sand, and/or building materials that contain them), instead of removing them through chemical or physical treatment. Leachability testing is typically performed to measure the immobilization of contaminants.

4.3.2.3 In Situ Chemical Oxidation/Reduction

In situ chemical oxidation/reduction is based on the delivery of chemical oxidants to the contaminated media in order to destroy contaminants by converting them to innocuous compounds. The oxidants applied are typically hydrogen peroxide, potassium permanganate, ozone, or, to a lesser extent, dissolved oxygen. The methods for delivery of the chemical may vary. In situ chemical oxidation/reduction has been used for groundwater, sediment, and soil remediation. It has been used to treat volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), including pesticides, PAHs, and polychlorinated biphenyls (PCBs) (EPA 1998). In Situ Chemical oxidation/reduction is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.2.4 Soil Flushing

In situ soil flushing is the extraction of contaminants from the soil with water or other suitable aqueous solutions. Soil flushing is accomplished by passing the extraction fluid through in-place soils using an injection or infiltration process. Extraction fluids must be recovered from the underlying aquifer and, when possible, they are recycled. The target contaminant group for soil flushing is inorganic compounds, including radioactive contaminants. Environmentally compatible surfactants may be used to increase the effective solubility of some organic compounds.

4.3.2.5 Soil Vapor Extraction

Soil vapor extraction (SVE) is an in situ unsaturated (vadose) zone soil remediation technology in which a vacuum is applied to soil to induce the controlled flow of air for the removal of VOCs and some SVOCs. Vapor leaving the soil may be treated to recover or destroy the contaminants, depending on local and state air discharge regulations. Geomembrane covers may be placed on the soil surface to prevent short-circuiting and to increase the radius of influence of the extraction wells. Groundwater depression pumps may be used to reduce groundwater upwelling induced by the vacuum or to increase the depth of the vadose zone. The target contaminant groups for in situ SVE are VOCs and some fuels. SVE is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.3 In Situ Thermal Treatment

In situ thermal treatment offers quick cleanup times, but it is generally the most costly type of treatment. Cost is driven by energy and equipment costs and is both capital and operation and maintenance (O&M) intensive. Two in situ thermal treatment technologies are described below: in situ vitrification and thermally enhanced SVE.

4.3.3.1 In Situ Vitrification

In situ vitrification (ISV) uses an electric current to melt soil or other earthen materials at extremely high temperatures (2,900 to 3,650°F), immobilizing most inorganics and destroying organic pollutants through pyrolysis (DOD 1996). Inorganic pollutants are incorporated within the vitrified glass and crystalline mass. Water vapor and organic pyrolysis combustion products are captured in a hood, which draws the contaminants into an off-gas treatment system. The vitrification product is a chemically stable, leach-resistant, glass and/or crystalline material similar to obsidian or basalt rock. The process destroys and/or removes organic materials. Radionuclides and heavy metals are retained within the vitrified mass.

4.3.3.2 Thermally Enhanced Soil Vapor Extraction

Thermally enhanced SVE uses electrical resistance/ electromagnetic/fiber optic/radio frequency heating or hot-air/steam injection to increase the volatilization rate of SVOCs and facilitate extraction. The process is otherwise similar to standard SVE, but requires heat resistant extraction wells. Thermally enhanced SVE is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.4 Ex Situ Biological Treatment

Ex situ treatment requires excavation of contaminated media, which may lead to increased costs for engineering and equipment, as well as, possible permitting and material handling/worker exposure considerations. Ex situ biological treatment processes include destruction or transformation techniques directed toward stimulating microorganisms to grow and use the contaminants as a food or energy source by creating a favorable environment for the microorganisms (DOD 1996).

Although not all contaminants are amenable to biodegradation, bioremediation techniques have been used successfully to remediate soils, sludges, and groundwater contaminated by petroleum hydrocarbons, solvents, pesticides, wood preservatives, and other organic chemicals. Ex situ biological treatment is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.5 Ex Situ Physical/Chemical Treatment

Ex situ physical/chemical treatment uses the physical properties of the contaminants or the contaminated medium to chemically convert, separate, or immobilize contaminants. For example, chemical reduction/oxidation is a destruction technology; soil washing, SVE, and solvent extraction are separation techniques; and solidification/stabilization is an immobilization technology. The following sections discuss the specific process options for ex situ physical-chemical treatment.

4.3.5.1 Chemical Extraction

In this process, contaminated soil and extractant are mixed in an extractor to dissolve soil contaminants. The extracted solution then is placed in a separator, where the contaminants and extractant are separated for treatment and further use. Physical separation steps often are used before chemical extraction to grade the soil into coarse and fine fractions, with the assumption that the fines contain most of the contamination. Physical separation also can enhance the kinetics of extraction by separating out particulate heavy metals, if present.

Chemical extraction does not destroy wastes, but is a means of separating hazardous contaminants from soils, sludges, and sediments. Two types of chemical extraction processes are described below:

- *Acid Extraction*—Acid extraction uses hydrochloric acid (HCL) to extract heavy metal contaminants from soils. In this process, soils are first screened to remove coarse solids. HCL is then introduced in the extraction unit. The residence time varies depending on the soil type, contaminants, and contaminant concentrations. The soil-extractant mixture is continuously pumped out of the mixing tank, and the soil and extractant are separated using hydrocyclones (DOD 1996).

- *Solvent Extraction*—Solvent extraction is a common form of chemical extraction using organic solvent as the extractant. It is commonly used in combination with other technologies, such as solidification/stabilization, incineration, or soil washing, depending upon site-specific conditions. Solvent extraction also can be used as a stand-alone technology in some instances. Organically bound metals can be extracted along with the target organic contaminants, thereby creating residuals with special handling requirements. Traces of solvent may remain within the treated soil matrix, so the toxicity of the solvent is an important consideration (DOD 1996).

4.3.5.2 Soil Washing

Soil washing is a water-based process for scrubbing soils ex situ to remove contaminants. The process removes contaminants from soils in one of two ways:

- By dissolving or suspending them in the wash solution (which can be sustained by chemical manipulation of pH for a period of time).

- By concentrating them into a smaller volume of soil through particle size separation, gravity separation, and attrition scrubbing (similar to techniques used in sand and gravel operations).

Soil washing systems incorporating most of the removal techniques offer the greatest promise for application to soils contaminated with a wide variety of heavy metals, radionuclides, and organic contaminants.

The concept of reducing soil contamination through the use of particle size separation is based on the finding that most organic and inorganic contaminants tend to bind, either chemically or physically, to clay, silt, and small organic soil particles. Washing processes separate fine clay and silt particles from the coarser sand and gravel soil particles to separate and concentrate the contaminants into a smaller volume of soil that can be further treated or disposed. The target contaminant groups for soil washing are SVOCs, fuels, and heavy metals. The technology can be used on selected VOCs and pesticides. The technology offers the ability for recovery of metals and can clean a wide range of organic and inorganic contaminants from coarse-grained soils (DOD 1996).

4.3.5.3 Magnetic Separation

Magnetic separation is used to extract slightly magnetic radioactive particles from host materials such as water, soil, or air. All uranium and plutonium compounds are slightly magnetic while most host materials are nonmagnetic. The process operates by passing contaminated fluid or slurry through a magnetized volume. The magnetized volume contains a magnetic matrix material such as steel wool that extracts the contamination particles from the slurry (DOD 1996).

4.3.5.4 Ex Situ Solidification/Stabilization

The ex situ S/S process physically binds or encloses contaminants within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization). Ex situ S/S requires disposal of the resultant materials after processing. Examples of S/S processes are described below:

- ***Bituminization***—In the bituminization process, wastes are embedded in molten bitumen and encapsulated when the bitumen cools. The process combines heated bitumen and a concentrate of the waste material, usually in slurry form, in a heated extruder containing screws that mix the bitumen and waste. Water is evaporated from the mixture to approximately 0.5 percent moisture. The final product is a homogenous mixture of extruded solids and bitumen (DOD 1996).

- ***Emulsified Asphalt***—Asphalt emulsions are very fine droplets of asphalt dispersed in water that are stabilized by chemical emulsifying agents. The emulsions are available as either cationic or anionic emulsions. The emulsified asphalt process involves adding emulsified asphalts having the appropriate charge to hydrophilic liquid or semi-liquid wastes at ambient temperature. After mixing, the emulsion breaks, the water in the waste is released, and the organic phase forms a continuous matrix of hydrophobic asphalt around the waste solids. In some cases, additional neutralizing agents, such as lime or gypsum, may be required. After sufficient time to set and cure, the resulting solid asphalt has the waste uniformly distributed throughout it and is impermeable to water (DOD 1996).

- ***Polyethylene Extrusion***—The polyethylene extrusion process involves the mixing of polyethylene binders and dry waste materials using a heated cylinder containing a mixing/ transport screw. The heated, homogenous mixture exits the cylinder through an output die into a mold, where it cools and solidifies. The properties of polyethylene produce a very stable, solidified product (DOD 1996).

- ***Pozzolan/Portland Cement***—The pozzolan/Portland cement process consists primarily of silicates from pozzolanic-based materials like fly ash, kiln dust, pumice, or blast furnace slag and cement-based materials like Portland cement. These materials chemically react with water to form a solid cementious matrix, which improves the handling and physical characteristics of the waste. They also raise the pH of the water, which may help precipitate and immobilize some heavy metal contaminants. Pozzolanic and cement-based binding agents are typically appropriate for inorganic contaminants. The effectiveness of this binding agent with organic contaminants varies (DOD 1996).

- ***Soluble Phosphates***—The soluble phosphates process involves the addition of various forms of phosphate and alkali for control of pH as well as for formation of complex metal molecules of low solubility to immobilize (insolubilize) the metals over a wide pH range. Unlike most other stabilization processes, soluble phosphate processes do not convert the waste into a hardened monolithic mass. One application of soluble phosphates and lime is in stabilizing fly ash by immobilizing the lead and cadmium in the ash (DOD 1996).

4.3.5.5 Chemical Reduction/Oxidation

Reduction/oxidation (Redox) reactions chemically convert hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. Redox reactions involve the transfer of electrons from one compound to another. Specifically, one reactant is oxidized (loses electrons) and one is reduced (gains electrons). Oxidizing agents most commonly used for the treatment of hazardous contaminants are ozone, hydrogen peroxide, hypochlorites, chlorine, and chlorine dioxide. The target contaminant group for chemical redox is inorganic compounds. Redox can be used but may be less effective for non-halogenated VOCs and SVOCs, fuel hydrocarbons, and pesticides (DOD 1996).

4.3.5.6 Solar Detoxification

In this process, vacuum extraction is used to remove contaminants from soils. After condensation, contaminants are mixed with a semiconductor catalyst (e.g., titanium dioxide) and fed through a reactor, which is illuminated by sunlight. Ultraviolet light activates the catalyst, which results in the formation of reactive chemicals known as "radicals." These radicals are powerful oxidizers that break down the contaminants into non-toxic byproducts, such as carbon dioxide and water. Target contaminant groups for solar detoxification include VOCs, SVOCs, solvents, pesticides, and dyes. The process also may remove some heavy metals from water (DOD 1996). Solar detoxification is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.6 Ex Situ Thermal Treatment

Ex situ thermal treatments include thermal processes used to increase the volatility (separation) and to burn, decompose, and/or detonate (destruction) the contaminants. Thermal desorption is an example of a thermal separation technology. Destruction technologies include incineration and pyrolysis. These ex situ thermal treatment technologies are described in the following sections. These might be used in conjunction with phyto-accumulation.

4.3.6.1 Incineration

Incineration requires high temperatures, 1,400 to 2,200°F, to volatilize and combust (in the presence of oxygen) halogenated and other refractory organics in hazardous wastes (DOD 1996). Auxiliary fuels often are employed to initiate and sustain combustion. The destruction and removal efficiency (DRE) for properly operated incinerators exceeds the 99.99 percent requirement for hazardous waste and can be operated to meet the 99.9999 percent requirement for PCBs and dioxins (DOD 1996). Off gases and combustion residuals generally require treatment. Various incineration processes are described below:

- ***Circulating Bed Combustor***—A circulating bed combustor (CBC) uses high-velocity air to entrain circulating solids and create a highly turbulent combustion zone that destroys toxic hydrocarbons. The high turbulence of the CBC produces a uniform temperature around the combustion chamber and hot cyclone. The CBC also completely mixes the waste material during combustion. Effective mixing and low combustion temperature reduce operating costs and potential emissions of such gases as nitrogen oxide (NO_X) and carbon monoxide (CO).

- ***Fluidized Bed***—The circulating fluidized bed uses high-velocity air to circulate and suspend the waste particles in a combustion loop and operates at temperatures up to 1,600°F (DOD 1996).

- ***Infrared Combustion***—The infrared combustion technology is a mobile thermal processing system that uses electrically powered silicon carbide rods to heat organic wastes to combustion temperatures. Waste is fed into the primary chamber and exposed to infrared radiant heat (up to 1,850°F) generated by the silicon carbide rods above a conveyor belt. A blower delivers air to selected locations along the belt to control the oxidation rate of the waste feed. Any remaining combustibles are incinerated in an afterburner.

- ***Rotary Kilns***—Commercial incinerator designs are rotary kilns, equipped with an afterburner, a quench, and an air pollution control system. The rotary kiln is a refractory lined, slightly inclined, rotating cylinder that serves as a combustion chamber and operates at temperatures up to 1,800°F (DOD 1996).

Incinerator off-gas requires treatment by an air pollution control system to remove particulates and neutralize and remove acid gases [HCl, NO_X, and sulfur oxides (SO_X)]. Baghouses, venturi scrubbers, and wet electrostatic precipitators remove particulates; packed-bed scrubbers and spray driers remove acid gases.

4.3.6.2 Thermal Desorption

Thermal desorption is a physical separation process and is not designed to destroy organics. Wastes are heated to volatilize water and organic contaminants. A carrier gas or vacuum system transports volatilized water and organics to the gas treatment system. The bed temperatures and residence times designed into these systems will volatilize selected contaminants, but typically will not oxidize them. Based on the operating temperature of the desorber, thermal desorption processes can be categorized into two groups: high temperature thermal desorption and low temperature thermal desorption. Thermal desorption is not applicable to the MED/AEC contaminants at the Painesville site.

4.3.6.3 Pyrolysis

Pyrolysis is the chemical decomposition induced in organic materials by heat in the absence of oxygen. Because some oxygen will be present in any pyrolytic system, nominal oxidation will occur. If volatile or semi-volatile materials are present in the waste, thermal desorption also will occur. Pyrolysis of organic materials produces combustible gases, including carbon monoxide, hydrogen and methane, and other hydrocarbons. Pyrolysis typically occurs under pressure and at operating temperatures above 800°F (DOD 1996). Pyrolysis gases may be treated in a secondary combustion chamber, flared, and partially condensed. Particulate removal equipment, such as fabric filters or wet scrubbers, also are required. Conventional thermal treatment methods, such as a rotary kiln or fluidized bed furnace, are used for waste pyrolysis. These kilns or furnaces would be physically similar to the equipment described in Section 4.3.6.1, but would operate at lower temperature and with less air supply than would be required for combustion. The molten salt process also may be used for waste pyrolysis.

The target contaminant groups for pyrolysis are SVOCs and pesticides. The process is applicable for the separation of organic compounds from refinery wastes, coal tar wastes, wood-treating wastes, creosote-contaminated soils, hydrocarbon-contaminated soils, mixed (radioactive and hazardous) wastes, synthetic rubber processing wastes, and paint waste (DOD 1996).

4.4 CONTAINMENT

Containment methods often are performed to prevent, or significantly reduce, the migration of contaminants in soils or groundwater. Containment is necessary whenever contaminated materials are to be buried or left in place at a site. In general, containment is performed when extensive subsurface contamination at a site precludes excavation and removal of wastes because of potential hazards, unrealistic cost, or lack of adequate treatment technologies.

Containment treatments offer quick installation times and are typically a low to moderate cost treatment group. Unlike ex situ treatment groups, containment does not require excavation of soils, that lead to increased costs from engineering design of equipment, possible permitting, and material handling. However, these treatments require periodic inspections for settlement, ponding of liquids, erosion, and naturally occurring invasion by deep-rooted vegetation. In addition, containment options generally involve the installation of groundwater monitoring wells that need to be periodically sampled and maintained. Even with these long-term requirements; containment treatments usually are considerably more economical than excavation and removal of the wastes. Two contaminant technologies, capping and subsurface barriers, are discussed in the following sections.

4.4.1 Capping

Capping is the most common form of remediation because it is generally less expensive than other technologies and effectively manages the human and ecological risks associated with a contaminated site. The design for modern impermeable caps usually conforms to the performance standards in 40 CFR 264.310, which addresses Resource Conservation and Recovery Act (RCRA) landfill closure requirements. These standards include minimum liquid migration through the wastes, low maintenance requirements for the cap, efficient site drainage, high resistance to damage by settling or subsidence, and a permeability lower than or equal to the underlying liner system or natural soils.

These performance standards may not always be appropriate, particularly when a cap is intended to be temporary, in places where precipitation/infiltration is very low, and when capped waste is not leached by infiltrating water. In these cases, a single-layered natural soil cap, an asphalt cap, or a concrete cap may be implemented to serve as an "exposure barrier."

The design of multilayered caps generally conforms to EPA's guidance under RCRA, which recommends a three-layered system consisting of an upper vegetative layer, a drainage layer, and an underlying low-permeability layer. Single-layered caps can be constructed of various low-permeability materials; however, natural soil mixes are not recommended because they are disrupted by freeze/thaw cycles and drying causes them to shrink and crack. The most effective single-layer caps are composed of concrete or bituminous asphalt. The selection of capping materials and cap design is influenced by factors such as local availability and costs of cover materials, nature of the wastes being covered, local climate and hydrogeology, and projected future use of the site.

Groundwater monitoring wells often are used in conjunction with caps to detect any unexpected migration of the capped material. A vapor-collection system always should be incorporated into a cap design when the capped material is volatile. Erosion and sedimentation control technologies such as ditches, dikes, berms, grading, and revegetation are often designed to control rainwater drainage from the cap.

The use of a cap for soil contaminated with radioactivity is based on the principle of blocking the exposure pathway. A single layer cap is just as effective at this as a multiplayer cap since it is only the thickness and density that impact the exposure or dose received from radionuclides. In the case of the Painesville site, reduction in infiltration is unnecessary since the underlying soils have a low permeability.

4.4.2 Subsurface Physical Barriers

Subsurface physical barriers are used for limiting and/or eliminating the movement of contaminants through the subsurface. Subsurface barriers are effective in maintaining the volume of waste and reducing the potential for migration to the surrounding geologic media or groundwater. In general, subsurface barriers are able to confine effectively the contaminant for extended time periods and provide a cost-effective method of remediation. Commercially available examples of this technology are discussed below:

- ***Sheet Pilings***—Sheet piling can be driven into the soil surrounding the zone of contamination to prevent lateral migration of contaminants.

- ***Slurry Wall***—A wall of low permeability is placed across (usually upgradient) the path of a contaminant plume or around a contaminant source. The most common types of slurry walls include soil bentonite, cement bentonite, and concrete.

- ***Grout Curtains***—Grout curtains are fixed underground physical barriers that involve pressure injection of stabilizing materials. Materials for grouting include cement, clays, bentonite, alkali silicates, and organic polymer grouts. In general, grout curtains are best suited for sealing fractures, fissures, solution cavities, and other voids in rock.

- ***Bottom Sealing***—Emplacement of a bottom seal by grouting involves drilling through the site, or directional drilling from the site perimeter, and injecting grout to form a horizontal barrier.

- ***Block Displacement***—Slurry is injected to form a perimeter seal and bottom layer seal. Block displacement may be advantageous when the aquifer is deep.

- ***Pneumatic Sealing***—High-pressure stream of air and water from a special jet nozzle erodes the soil. By turning the nozzle through a complete rotation, a flat circular cavity is formed. The cavity then is grouted, with intersecting grouting masses forming the barrier.

- ***Synthetic Membrane Cutoff Wall***—Synthetic liners are placed to restrict vertical flow. Liners could be similar to those considered for capping.

- ***Dynamic Deep Compaction***—Compaction of subsurface zones decreases permeability and creates a temporary confining barrier.

- ***Hydraulic Barrier***—A system of pumping wells installed downgradient from the plume is used to create a hydraulic barrier that prevents contaminant migration.

4.5 REMOVAL

Removal involves the excavation of impacted soils. Excavation is a relatively simple process that uses proven technology. Contaminated soils and earth materials are excavated with conventional construction equipment, such as backhoes, draglines, front-end loaders, and even shovels. The type and size of the impacted area determines the type of equipment required for an effective cleanup.

Although no absolute limitations are placed on the materials that can be excavated and removed, worker health and safety are important considerations in the decision to excavate explosive, reactive, or highly toxic materials. Excavation and removal apply to almost all site conditions; however, such actions may become cost-prohibitive at great depths or in complex hydrogeologic environments. Excavation is an integral first step in the use of many treatment technologies.

4.6 DISPOSAL

Disposal involves the transportation of contaminated materials to a licensed and/or permitted off-site treatment and/or disposal facility. A number of facilities can be used for disposal. RCRA Class C landfills may be able to accept the material depending on facility specific limitations on radioactivity. Licensed facilities can also accept the material. On-site disposal of remediated or clean soil may also occur during the implementation of a remedial response action. Disposal will follow all requirements of EC-200-1-3 (USACE 2000).

5.0 SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS

This section includes the initial and detailed screening of the technology types and process options considered for remediating the contaminants of concern (i.e., radionuclides) at the Painesville site.

5.1 INITIAL SCREENING ANALYSIS

In the initial screening phase, the technology types and process options identified in Section 4 are evaluated on the basis of technical implementability. Technical implementability is determined based on the following criteria:

- ***Site Characteristics***—Site characteristics (e.g. geologic conditions and soil characteristics) were examined to determine whether the technology was appropriate for the site.

- ***Contaminant Characteristics***—Technologies may be ineffective, unsafe, or otherwise unsuitable for achieving the remedial action objectives because of the characteristics of the COCs (e.g., volatility, solubility, and density) in soil at the study areas.

- ***Technology Development***—Technology development refers to those emerging technologies that appear to be applicable to a general group of contaminants, but have not been evaluated for specific compounds or have only been tested at a laboratory scale with minimal published data concerning effectiveness. An emerging technology is different from an innovative technology, which has been demonstrated more at a pilot- or full-scale operation and for which more performance data are available. Full-scale development of an emerging technology would require extensive work prior to implementation. For this reason, this type of technology would be eliminated.

Based on these criteria, all process options that are applicable or potentially applicable for remediation of soils at the Painesville site are retained in this initial screening process. Technologies and process options not applicable for remediation of the contaminated soils are eliminated from further consideration.

For the six general response actions, 32 process options were evaluated and 11 were screened out based on technical implementability. Soil flushing and subsurface physical barriers would not work because of the nature of the soils at the site, or the fact that the contaminants are in soil and not groundwater. A number of treatment technologies are not applicable to radionuclides. These include: enhanced bioremediation, bioventing, land treatment, chemical oxidation and reduction (of soil), soil vapor extraction and exsitu oxidation/reduction. Two technologies are not well enough developed to be considered further. These are electrokinetic and magnetic separation. Figure 5.1 presents the results of this initial screening. As shown in this figure, each technology is briefly described and followed by a rationale for retaining or eliminating it.

5.2 DETAILED SCREENING ANALYSIS

Technology processes considered to be implementable are assessed in greater detail before selecting at least one process to represent each technology type. One representative process is selected, if possible, to facilitate the alternative development evaluation and provide a basis for developing preliminary designs. In some instances, additional processes may be necessary to contain or treat the media or residuals associated with a given treatment process. For instance, it is possible to use several different physical/chemical processes for two different treatment alternatives, thereby necessitating the inclusion of more than one process option to achieve remedial action objectives.

The technology processes are evaluated using three major criteria: effectiveness, implementability, and cost. Of these criteria, effectiveness is the most important. Implementability and cost are factored into the assessment to determine the final screening decision as to whether the process option is retained. It is important to note that at this stage of the analysis these criteria are applied to the technologies within the general response actions they are intended to satisfy and not to the site as a whole. These criteria, as applied during the analysis, are defined below:

- ***Effectiveness***—The evaluation of the effectiveness of the technology/process option addresses the following elements:
  - Potential effectiveness in handling the areas/volumes of media and meeting remediation goals,
  - Potential impacts on human health and the environment,
  - Reliability of the process with respect to contaminants and site conditions.
- ***Implementability***—The evaluation of implementability encompasses the technical and administrative feasibility of applying the technology. Technical implementability was addressed primarily in the initial screening. The institutional aspects of implementability evaluated in detailed screening include permitting constraints; availability of treatment, storage, and disposal services; and availability of equipment and skilled workers.
- *Cost*—Engineering judgment is applied when evaluating the relative total cost (capital and O&M) associated with each technology. Figure 5.2 provides high-, medium-, and low-cost estimates used to evaluate the total cost of each process option.

Of the 21 process options assessed for the remediation of soil, 7 were eliminated on the basis of the 3 screening criteria. Implementation difficulties and no change in direct exposure pathways preclude the further consideration of solidification both in-situ and ex-situ (the site would not be fully usable after these or the contaminants would still have to be disposed). Onsite disposal of radionuclides above background in a permitted landfill is prohibited under Ohio Law and leaving the material in place without other treatment would not remove the source of the toxicity. However, clean treatment residues might be disposed onsite. Cost considerations indicate that vitrification, chemical extraction and ex-situ solidification would be too expensive. Figure 5.2 presents the results of this detailed screening. As shown in the figure, in situ s/s was eliminated in the detailed analysis primarily due to its ineffectiveness in mitigating exposure to the COCs. In situ vitrification was eliminated based on implementability and high costs. For ex situ physical/chemical, chemical extraction was eliminated based on effectiveness and high cost. For capping technology types, multi-layer media caps were eliminated from further consideration based on implementability and cost. As there are several possible materials remaining for capping one has been selected (asphalt) to represent the containment option. The asphalt cap was selected as a mid priced option of all the capping materials.

5.3 SUMMARY OF TECHNOLOGY SCREENING

The technologies and process options that passed the initial and detailed screening are retained for development of remedial alternatives. The retained remedial options are summarized in Table 5.1.

Table 5.1. Summary of Retained Technologies for Remediation of Soil Painesville, Ohio

General Response Action	Technology Type	Remedial Technology
No Action	No Action	No Action
Limited Action	Land Use Controls	Legal Mechanisms Administrative Mechanisms Fencing Land Use Controls Implementation Plan
	Environmental Monitoring	Soil Monitoring Air Monitoring Surface Water Monitoring Groundwater Monitoring
Containment	Capping	Native soil Clay Asphalt Concrete
Removal	Excavation	Excavation
Disposal	Onsite Disposal	In Situ Soil Disposal
	Off-site Disposal	Licensed and/or Permitted Disposal Facility

Figure 5-1. Initial Screening of Remedial Technologies and Process Options
Painesville, Ohio

General Response Actions	Remedial Technology Type	Process Options	Description	Screening Comment
No Action	No Action	No Action	No action is taken to implement remedial technologies to reduce hazard to potential human or ecological receptors.	Required by the National Contingency Plan as a baseline comparison with other alternatives.
Limited Actions	Land Use Controls	Legal Mechanisms	Legal mechanisms are issued for contaminated property to prevent direct contact or restrict further construction/ excavation.	Potentially Applicable. Required with remedies where waste is left in place. Effective in controlling exposures through direct contact, inhalation, and ingestion.
		Fencing	A perimeter fence around the site, with access through gates, is either guarded by security system and/or personnel.	Potentially Applicable. Will be used in conjunction with all alternatives during implementation. Effective in controlling exposure from direct contact with contaminated soil. Does not reduce contaminant levels in soil.
		Land Use Control Implementation Plan	A site-specific land use controls implementation plan will be developed to provide a clear understanding of the site's land use controls and the responsibilities for ensuring the land use controls remain protective of human health and the environment.	Potentially Applicable. Required with remedies where waste is being left in place.
	Environmental Monitoring	Soil Monitoring	Used to determine if levels of contaminants are decreasing over time.	Potentially Applicable. May be required for remedies where metals and radiological contaminants are being left in place.
		Air Monitoring	Used to determine if onsite contaminants are migrating offsite	Potentially Applicable. May be required for remedies where metals and radiological contaminants are being left in place. Used in conjunction with excavation alternatives to monitor offsite migration.
		Surface Water Monitoring	Used to determine if contaminants are migrating due to erosion of surface soil into nearby surface water.	Potentially Applicable. May be required for remedies where metals and radiological contaminants are being left in place. Used in conjunction with excavation alternatives to monitor offsite migration.
		Groundwater Monitoring	Used to determine if contaminants in the soil are leaching into the underlying aquifer.	Potentially Applicable. May be required for remedies where radiological contaminants are left in place. Monitoring may be used to make sure the implemented system is functioning properly by measuring the COCs after implementation of a remedial alternative.

Figure 5-1. Initial Screening of Remedial Technologies and Process Options
Painesville, Ohio (Continued)

General Response Action	Remedial Technology Type	Process Option	Description	Screening Comment
Treatment	In Situ Biological	Phytoremediation	Metals contaminants are accumulated by plants. The plants are harvested and discarded at an appropriate disposal facility	Not Applicable. The technology is still iin demonstration. Long treatment ttimes would be required
		Enhanced Bioremediation	Microorganisms are stimulated by circulating water-based solutions through the contaminated soil. Biodegredation is enhanced by the addition of nutrients and/or by mixing of soils.	Not applicable for radionuclides
		Bioventing	Oxygen is delivered to contaminated unsaturated soils (above the water table) by forcing air movement (either extraction or injection of air) to increase oxygen concentration and stimulate biodegredation	Not applicable for radionuclides
		Land Treatment	Contaminated soil is treated in place by tilling to achieve aeration. Periodic tilling enhances the biologic activity in the soil	Not applicable for radionuclides
	In Situ Physical/ Chemical	Electrokinetic Remediation/ Separation	Electrochemical and electrokinetic processes are used to remove metals and polar contaminants from soil.	Potentially applicable. Full scale has not been demonstrated for radionuclides at Painesville
		Solidification/ Stabilization	Contaminants are physically bound or trapped in a stabilized mass (solidification), chemical reactions are induced between stabilizing agents and contaminants to reduce their mobility (stabilization).	Potentially applicable for immobilizing radionuclide
		Chemical Oxidation/ Reduction	Oxidant is delivered to convert the contaminants to a more stable, less toxic or inert form.	Not applicable for radionuclides
		Soil Flushing	Water containing a solubility enhancer is flushed through contaminated zone to groundwater. Contaminatns are extracted with groundwater.	Not applicable. Difficult to implement the groundwater level is not close to soil contamination zone. Difficult to implement in low permeability heterogeneous soil.
		Soil Vapor Extraction	Vacuum is applied through extraction wells. Volatiles and semivolatiles difuse through soil to extraction weills.	Not applicable for radionuclides

Figure 5-1. Initial Screening of Remedial Technologies and Process Options
Painesville, Ohio (Continued)

General Response Action	Remedial Technology Type	Process Option	Description	Screening Comment
Treatment (continued)	Ex Situ Physical/ Chemical	Magnetic Separation	Magnets used to separate dry granular or powdery material or magnetic filters used for trace contaminants adsorbed by magnetic media in an aqueous stream.	Not applicable technology is still in demonstration phase.
		Solidification/ Sabilization	Contaminants are physically bound or enclosed within a stabilized mass, or chemical reactions are induced between the stabilizing agents and contaminants	Potentially applicable for immobilizing COCs in soil
		Chemical Oxidation/ Reduction	Reduction/Oxidation converts contaminants to nonhazardous or less toxic compounds that are more stable, less mobile, and/or inert.	Not applicable for COCs present at the Painesville site.
		Soil Washing	Liquid used to separate size fractions of soil. Contaminants are in one fraction	Potentiallly applicable but not efficient in fine soils like Painesville

Figure 5-1. Initial Screening of Remedial Technologies and Process Options Painesville, Ohio (Continued)

General Response Action	Remedial Technology Type	Process Option	Description	Screening Comment
Containment	Capping	Native Soil	Area of contamination is covered with a layer of clean soil.	Potentially applicable for minimizing exposure to radionuclides at Painesville Site.
		Clay	Compacted clay cover with soil over areas of contamination.	Potentially applicable for minimizing exposure to radionuclides at Painesville Site.
		Multi-layer Media Cap	Multiple layers of different media over areas of contamination. Generally composed of an upper vegetative layer, a drainage layer, and an underlying low-permeability layer.	Potentially applicable for minimizing exposure to radionuclides at Painesville Site. Much more costly than other caps.
		Asphalt Cap	A layer of asphalt is applied over areas of contamination.	Potentially applicable for minimizing exposure to radionuclides at Painesville Site.
		Concrete Cap	A layer of concrete is applied over areas of contamination.	Potentially applicable for minimizing exposure to radionuclides at Painesville Site.
		Subsurface Physical Barrier	Providing subsurface barrier that prevents migration of contaminants.	Not applicable for soil contamination.
Removal	Soil Excavation	Earth Moving Equipment	Mechanically or hydraulically operated units normally used for trenching or other subsurface excavation at ground level.	Potentially applicable for excavating, loading, and moving contaminated soils.
Disposal	Onsite Disposal	Ex Situ Soil Disposal	Disposal of fully remediated or treated soils onsite.	Potentially applicable. State approval required.
		In Situ Soil Disposal	The disposal of soil that has been treated in place utilizing site closure and post-closure techniques.	Potentially applicable when used in conjunction with in situ treatment.
	Offsite Disposal	RCRA C Landfill (Hazardous)	Solid hazardous waste is disposed of in an offsite RCRA Class C landfill.	Potentially applicable for radionuclides meeting permit requirements.
		RCRA D Landfill (Nonhazardous)	Solid nonhazardous waste is disposed of in an offsite RCRA Class D landfill.	In Ohio not applicable for any material above background
		Permitted Disposal Facility	Soil debris meeting facility license requirements can be disposed of at a commercial facility.	Potentially applicable.

Technologies that were eliminated based on technical implementability.

Figure 5-2. Detailed Screening of Remedial Technologies and Process Options
Painesville, Ohio

General Response Action	Remedial Technology Type	Process Option	Effectiveness	Implementability	Cost
No Action	No Action	No Action	Does not achieve remedial action objectives.	Not Applicable	None
Limited Actions	Land Use Controls	Legal Mechanisms	Less effective in mitigating human health and ecological risks by restricting land use. Does not reduce contaminant levels in soil.	Implementable. May be difficult to obtain regulatory approval.	Low
		Fencing	Effective in controlling exposure by limiting the direct contact with contaminated soil. Does not reduce contaminant levels in soil.	Easy to implement. Site access will be restricted.	Low
		Land use Contorls Implementation Plan	Does not reduce contaminant levels in soil.	Easy to implement.	Low
	Environmental Monitoring	Soil Monitoring	Does not reduce contaminant levels in soil. Used to evaluate the long term effectiveness of a remedial action.	Easy to implement.	Low
		Air Monitoring	Does not reduce contaminant levels in soil. Used to monitor the offsite migration of contaminants during construction.	Easy to implement.	Low
		Surface Water Monitoring	Does not reduce contaminant levels in soil. Used to monitor the offsite migration of contaminants during construction.	Easy to implement.	Low
		Groundwater Monitoring	Does not reduce contaminant levels in soil. Used to evaluate the long term effectiveness of a remedial action.	Easy to implement.	Low
Treatment	In Situ Physical/ Chemical	Solidification/ Stabilization	Effective for immobilizing metals in soil. Not effective for reducing toxicity or volume. Not effective for mitigating exposure to radiological contaminants.	Implementable. Vendors and services are available. Solidified surface may not be compatible with future development.	Medium

General Response Action	Remedial Technology Type	Process Option	Effectiveness	Implementability	Cost
Treatment (continued)	In Situ Thermal	Vitrification	Effective for immobilizing metals in soil. *Not effective for reducing toxicity or* volume.	Difficult to implement. Limited number of vendors and services are available. Vitrified surface may not be compatible with future development.	High
	Ex Situ Physical/ Chemical	Chemical Extraction	Effective for removing metals in soil. Not effective for reducing toxicity or volume. Potentially large amounts of chemical waste products will be generated which will require additional waste treatment. *Higher clay content in soil may reduce* extraction efficiency.	Implementable. Vendors and services are available.	High
		Solidification/ Stabilization	Effective for immobilizing metals in soil. May result in a significant increase in material volume.	Implementable. Vendors and services are available. Limits future land uses.	Medium
Containment	Capping	Native Soil	Effective in controlling exposure by limiting the direct contact with contaminated soil. High potential for cracking due to freeze/ thaw. Does not reduce contaminant levels in soil.	Implementable using standard construction techniques and available materials. May be difficult to obtain regulatory approval. Limits future land use.	Low
		Clay	Effective in controlling exposure by limiting the direct contact with contaminated soil. Does not reduce contaminant levels in soil.	Implementable using standard construction techniques and available materials. Limits future land use.	Medium
		Multi-layer Media Cap	Effective in controlling exposure by limiting the direct contact with contaminated soil. *Does not reduce contaminant levels in* soil.	Implementable using standard construction techniques and available materials. More difficult to construct compared to single-layered caps. Limits future land use.	Medium
		Asphalt Cap	Effective in controlling exposure by limiting the direct contact with contaminated soil. Does not reduce contaminant levels in soil.	Implementable using standard construction techniques and available materials. Limits future land use.	Medium
		Concrete Cap	Effective in controlling exposure by limiting the direct contact with contaminated soil. Does not reduce contaminant levels in soil.	Implementable using standard construction techniques and available materials. Limits future land use.	Medium

Figure 5-2 Detailed Screening of Remedial Technologies and Process Options Painesville, Ohio (Continued)

General Response Action	Remedial Technology Type	Process Option	Effectiveness	Implementability	Cost
Removal	Soil Excavation	Earth Moving Equipment	Not effective for reducing toxicity or mobility. Primarily used for excavating, loading, and moving contaminated soils.	Easy to Implement.	Medium
Disposal	*Onsite Disposal*	*Ex Situ Soil Disposal*	Not effective in degrading contamination. Primarily used in conjunction with a treatment process to dispose of treated residuals	Implementable. For treatment residuals. May require regulatory approval.	Low
		In Situ Soil Disposal	Not *effective in degrading contamination.* Primarily used in conjunction with in situ process options.	Implementable. May require regulatory approval	Low
	Offsite Disposal	Licensed/Permitted Disposal	Removal of risk from site. However, no effect on the volume or toxicity of material.	Implementable. May require transportation of a large quantity soil.	High

Technologies that were eliminated based on effectives, implementability, and/or cost.

6.0 DEVELOPMENT OF REMEDIAL ALTERNATIVES

This section presents the proposed remedial alternatives that address the environmental conditions and exposure risks associated with the soil contamination at the Painesville site. In the alternative development process, the appropriate range of contaminant removal, containment, treatment, disposal, and management options are selected for evaluation in the detailed alternative analysis phase of the FS. Each alternative in this section is developed to meet the RAOs by assembling the remedial technologies and process options retained in Section 5. The following sections provide descriptions of the proposed remedial alternatives.

6.1 ALTERNATIVE 1—No Action

Under the no action alternative, no additional remedial action would be taken at the Painesville site. The current and future land owners would continue to maintain the site controls to verify that no significant changes in site conditions occur.

This alternative is included to provide a baseline for evaluation of other alternatives in accordance with the NCP and CERCLA requirements. The acceptability of the no action alternative will be determined in relation to the assessment of known site risks and by comparison to other remedial alternatives.

6.2 ALTERNATIVE 2—CAPPING OF CONTAMINATED SOILS IN PLACE (ASPHALT CAP)

This alternative combines the installation of an asphalt cap with land use controls and environmental monitoring. Impacted soil exceeding the preliminary remediation goals would be covered in-place by a one-foot thick asphalt cap. Any regular capping material would suffice since the primary purpose is to block an exposure pathway. The cap(s) would function as a barrier to reduce potential radiation exposure to site workers and the public. In addition, the cap(s) would restrict the migration of contaminants through dispersion and though transport by infiltrating rainwater. A possible enhancement to the capping option would be to consolidate the contaminated materials to a single location for ease of inspection and maintenance. Whether consolidated or not in the event of a failure of land use controls the one-foot thickness would protect most users in scenarios such as a trespasser. Land use controls would be imposed to ensure that the impacted material is not disturbed unless further remedial actions are taken. Inspections and maintenance of the cap(s) and environmental monitoring would continue following implementation of the remedial action to mitigate potential exposures in the long-term.

6.3 ALTERNATIVE 3—EXCAVATION AND OFF-SITE DISPOSAL

This alternative involves the excavation of impacted soil exceeding a subsistence farmer SOR of 1, off-site transportation, and disposal of the soil at a commercial facility licensed and/or permitted to accept radiological waste. Dust suppression and erosion control measures would be implemented as needed during the remedial action to protect the workers and minimize airborne migration of radionuclides. Site access restrictions and environmental monitoring (air and surface water) would be maintained throughout the remedial action. Excavated areas would be backfilled with clean soil, graded, and re-vegetated. Figures 6.1 to 6.3 illustrate the impacted areas for the various IAs. Following completion of the remedial action, the site would be released for unrestricted use.

6.4 ALTERNATIVE 4—LIMITED EXCAVATION AND OFF-SITE DISPOSAL

This alternative involves the excavation of impacted soil exceeding an industrial SOR of 1, off-site transportation, and disposal of the soil at a commercial facility licensed and/or permitted to accept radiological waste. Dust suppression and erosion control measures would be implemented as needed during the remedial action to protect the workers and minimize airborne migration of radionuclides. Site access restrictions and environmental monitoring (air and surface water) would be maintained throughout the remedial action. Excavated areas would be backfilled with clean soil, graded, and re-vegetated. Figures 6.1 to 6.3 illustrate the impacted areas for the various IAs. Following completion of the remedial action, the site would be released for industrial use. Land use controls limiting the site to industrial uses would need to be imposed.

7.0 DETAILED ANALYSIS OF ALTERNATIVES

Section 300.430 (e) of the NCP lists nine criteria by which each remedial alternative must be assessed. The acceptability and performance of each alternative against the criteria is evaluated individually so that relative strengths and weaknesses may be identified. Assessments against two of the criteria (Overall Protection of Human Health and the Environment and Compliance with Applicable or Relevant and Appropriate Requirements) relate directly to statutory findings and therefore are categorized as threshold criteria. The threshold criteria must be satisfied in order for an alternative to be eligible for selection. Five of the criteria (Long-term Effectiveness and Permanence, Reduction of Toxicity, Mobility, or Volume through Treatment, Short-term Effectiveness, Implementability, and Cost) represent the primary criteria upon which the analysis is based. These balancing criteria are used to weigh major tradeoffs among alternatives. In addition CERCLA Section 121 sets forth requirements for remedial action including the preference for treatment which reduces volume, toxicity or mobility. The remaining two criteria, State Acceptance and Community Acceptance, are categorized as modifying criteria. The modifying criteria are evaluated following comments on the RI/FS report and the proposed plan and will be addressed once a final decision is made and the Record of Decision (ROD) is prepared. The nine criteria are briefly defined as follows:

- ***Threshold Criteria***
  - **Overall Protection of Human Health and the Environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or land-use controls.
  - **Compliance with Applicable or Relevant and Appropriate Requirements** addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of Federal and State environmental statutes and/or provide grounds for invoking a waiver.
- ***Balancing Criteria***
  - **Long-term Effectiveness and Permanence** refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once the cleanup goals have been met.
  - **Reduction of Toxicity, Mobility, or Volume through Treatment** is the anticipated performance of the treatment technologies that may be employed in a remedy.
  - **Short-term Effectiveness** refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.
  - **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.
  - **Cost** includes capital, and operation and maintenance costs.

- ***Modifying Criteria***
  - **State Acceptance** indicates whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative.
  - **Community Acceptance** is assessed following a review of the public comments received on the Proposed Plan.

The following sections evaluate and compare each of the remedial alternatives with respect to the nine criteria as outlined in Section 300.430 (e) of the NCP. Table 7.1 presents a summary of the detailed analysis for each of the remedial alternatives.

7.1 ALTERNATIVE 1—NO ACTION

This alternative involves no remedial actions to prevent exposure to contaminated soil. The CERCLA program requires that the no action alternative be evaluated to establish a baseline for comparison of other alternatives, especially, in terms of cost and protection of human health and the environment. Under this alternative, current and future risk to human health and the environment would neither be eliminated nor reduced. The assessment of the alternative with respect to the nine criteria is presented below:

Overall Protection of Human Health and the Environment—Dose and risk estimates for the Painesville site, by exposure unit (EU) and receptor are presented in Appendix I. The baseline risk and dose estimates presented in Appendix I were calculated for a 2000 m^2 area while the dose and risk estimates presented in the baseline risk assessment (BRA) were calculated for EU specific areas. Since the individual Painesville EUs are cover areas of less than 2000 m^2 the dose and risk estimates presented in Appendix I are conservative estimates. These calculations show that the no action alternative would not provide adequate protection to industrial, residential or subsistence farmer receptors. However the ecological risk assessment found no unacceptable risk to the environment. Risk and dose estimates were calculated for year 0 and for year 1,000. The highest baseline dose seen for the industrial receptor exposed to soil 0 to 2 feet below land surface following the no action alternative was 1.1×10^2 mrem/yr in EU 8 at year 38. The highest dose seen for the residential receptor exposed to soil 0 to 10 feet below land surface following the no action alternative (baseline dose) was 1.0×10^2 mrem/yr in EU 1 at year 19. For the subsistence farmer the highest dose was 3.5×10^2 mrem/yr for exposure to soil 0 to 10 feet below land surface in EU 1 at year 0.

Compliance with Applicable or Relevant and Appropriate Requirements—The no action alternative would not satisfy ARARs, because this alternative would not eliminate human exposure to contaminant concentrations higher than the action levels. Action levels define the concentrations of contaminants that have been shown to satisfy the ARARs.

Long-term Effectiveness and Permanence—This alternative does not provide long-term effectiveness and permanence. The magnitude of residual risk remains the same since no action would be applied, and there is no concern about the adequacy and reliability of controls because none would be applied.

Reduction of Toxicity, Mobility, or Volume through Treatment—This alternative would not reduce the toxicity, mobility, or volume of contaminated soil.

Short-term Effectiveness—There would be no additional risks posed to the community, workers, or the environment as a result of implementing this alternative.

Table 7.1 Summary of the Detailed Analysis for the Remedial Alternatives, Painesville, Ohio

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	**Capping of Contaminated Soils In-place (Asphalt Cap)**	**Excavation and Off-site Disposal**	**Limited Excavation and Off-site Disposal**
Overall Protection of Human Health and the Environment	No reduction in human health or ecological risk; potential for exposure to radionuclides remains.	Meets the remedial objectives for protection of human health and the environment for an industrial worker.	Meets the remedial objectives for protection of human health and the environment under a subsistence farmer scenario.	Meets the remedial objectives for protection of human health and the environment under an industrial scenario.
Compliance with ARARs	This alternative would not satisfy the ARARs.	Satisfies the ARARs may require a state license.	Satisfies the ARARs.	Satisfies the ARARs, may require a state license.
Long-term Effectiveness and Permanence	This alternative does not provide long-term effectiveness and permanence.	Land use controls and inspection and maintenance of the caps are required to provide long-term effectiveness.	Provides long-term effectiveness and permanence by removing soil containing radionuclides exceeding the action level.	Provides long-term effectiveness and permanence by removing soil containing radionuclides exceeding the action level. Land use controls are required to provide long-term effectiveness
Reduction of Toxicity, Mobility, and/or Volume through Treatment	No reduction in the radionuclides toxicity, mobility, or volume.	Reduces contaminants mobility but does not reduce toxicity and volume.	No treatment. Does not reduce mobility, volume or toxicity by treatment.	No Treatment. Does not reduce mobility, volume or toxicity by treatment.
Short-term Effectiveness	There are no short-term hazards to site workers and the community since no remedial actions are implemented.	Minimal risk to remedial workers during implementation; negligible risk to community and environment due to limited intrusive activities.	Risk to remedial workers during implementation. The risk would be mitigated through a health and safety plan.	Risk to remedial workers during implementation. The risk would be mitigated through a health and safety plan.
Implementability	There are no technical or administrative implementability issues.	There are no technical implementability issues; the land owner and state may object to this alternative, technology is available and reliable; maintenance and inspections are easily implemented; services and materials are readily available. Administratively more difficult than alternative 3 due to land use control requirements.	There are no technical or administrative implementability issues; services and materials are readily available.	There are no technical or implementability issues; services and materials are readily available. Administratively more difficult than alternative 3 due to land use control requirements.
Cost, discounted (7%)	$0	$2,606,000	$5,145,000	$1,632,000
Volume of contaminated soil remediated.	NA	4100 yd^3	4100 yd^3	730 yd^3
State Acceptance	To be evaluated following regulatory review of the FS and proposed plan.	To be evaluated following regulatory review of the FS and proposed plan.	To be evaluated following regulatory review of the FS and proposed plan.	To be evaluated following regulatory review of the FS and proposed plan.
Community Acceptance	To be evaluated following review of the FS and proposed plan.	To be evaluated following review of the FS and proposed plan.	To be evaluated following review of the FS and proposed plan.	To be evaluated following review of the FS and proposed plan.

Implementability—This alternative is readily implementable.

Cost—The total estimated capital and O&M costs (present worth) of the no action alternative is $0.

State Acceptance—This criterion will be addressed in the ROD once comments on the RI/FS report and proposed plan (PP) have been received.

Community Acceptance—This criterion will be addressed in the ROD once comments on the RI/FS report and PP have been received.

7.2 ALTERNATIVE 2—CAPPING OF CONTAMINATED SOILS IN PLACE (ASPHALT CAP)

Alternative 2 includes the use of a containment technology (e.g., asphalt cap), land-use controls (e.g., inspection and maintenance of the cap and application of land-use restrictions), and environmental monitoring (e.g., groundwater monitoring) to address soil contamination at the Painesville site. The locations where this alternative would be implemented include Areas A, B, C, D, G, and the Rubble Pile area. The installation of a cap would prevent human and ecological exposure to the contaminated soil. With land use restrictions this alternative would be protective of the industrial worker.

A one foot thick asphalt cap would be installed over each area of soil that contains radionuclides at levels above the Action Levels. A total of six caps would be constructed at the Painesville site. The asphalt cap would be one foot thick to provide basic protection in the event of the failure of land use controls and the edges would extend sufficiently beyond the area of impacted soil to ensure cap integrity. The total site area effected by this alternative would be approximately 75,000 square feet (8,333 square yards).

Site preparation activities would be required prior to construction of the caps including, clearing obstacles that would interfere with the implementation of this alternative, identification of existing utilities, and installation of erosion and sediment controls to mitigate the off-site migration of potentially contaminated soil during construction activities. Because the capping material is asphalt, it would be installed over a compacted base on the current ground surface.

A yearly inspection and maintenance program would be established for the caps. This activity is required to ensure the integrity and competence of the caps are not compromised from cracking, burrowing animals, and/or erosion. In addition, a groundwater monitoring program would be established to determine if contaminants are migrating off-site. At a minimum, one upgradient and one downgradient groundwater monitoring well would be installed in each area where a cap is constructed. Samples would be collected on an annual basis and analyzed for the COCs (radium, uranium, and thorium). In addition, a gamma walkover would be conducted for each capped area on an annual basis.

Land use controls would be placed on the future use of the property because the site is contaminated at levels posing risks to human health. These controls would ensure that the current and future owners and users are aware of the site contamination and are bound by conditions imposed on its use. The land use controls would include restricting intrusive activities, such as excavation, to minimize human and ecological contact with the contaminated soil.

Overall Protection of Human Health and the Environment—This alternative would provide adequate protection of human health and the environment for an industrial use scenario through the containment of soil contaminated with radionuclides and the reduction of exposure pathways. The capping alternative would provide shielding to reduce radiation exposures minimizing the potential risks to onsite workers and the public. In addition, ecological receptors would be protected by precluding access to the contaminated soil. Quantitative dose and risk estimates were not completed for the capping alternative; however, residual risk are anticipated to be an order of magnitude lower than those estimated for the No Action alternative. Placement of the cap would reduce risk by eliminating the inhalation and ingestion pathways. The cap would also provide shielding that would reduce risk due to external exposure to radon. Since the RESRAD calculations assumed that receptors occupy the center of the area, the maintenance of a one foot thick asphalt cover in these areas would greatly reduce occupancy doses. Under the capping alternative the most likely receptors would be a maintenance worker or someone who parks his car on cap materials. Both of these receptors are expected to have greatly reduced exposure rates.

Significant environmental impacts associated with the implementation of this alternative are unlikely. The Painesville site does not currently support a substantial wildlife habitat because of its small size and industrial development.

Compliance with Applicable or Relevant and Appropriate Requirements— This alternative would satisfy both proposed ARARs by preventing exposure to the contaminated soil and limiting the potential migration of the COCs in soil. Due to the use of a one foot asphalt cap, exposures to ionizing radiation would be reduced by approximately 90%. This achieves exposures ALARA. However, since the site would not meet the requirements for a release free of radiological restrictions found in OAC 3701-1-38 the site may require a state license.

Long-term Effectiveness and Permanence—Soil contaminated with radionuclides would still remain within the boundary of the Painesville site after the implementation of this alternative. The asphalt caps, installed over areas of soil containing radionuclides at concentrations above the Action Level, would serve as an effective barrier for potential receptors. There is some uncertainty over the long-term reliability of this alternative. Land use controls would be required to prevent current and future land owners from breaching the containment. In addition, a land use controls implementation plan would be needed to ensure the land use controls remain protective of human health and the environment. If the land use controls and maintenance activities are not maintained by the future owners, the goal of long-term effectiveness can not be achieved. However, the cap would reduce the potential for exposure even in the event of a failure of land use controls. A failure in the containment controls might pose risks to human health and the environment surrounding the facility. A liability for future impacts to human health and the environment exists in the event of a failure in the containment controls.

Reduction of Toxicity, Mobility, or Volume through Treatment—This remedial alternative would provide a reduction in the mobility of the contaminants; however, there would be no change to the toxicity or volume of contamination since no treatment would be performed. This controlled mobility is attributable to the clay-rich soils present at the Painesville site. Clay soils have a high cation exchange capacity (CEC), therefore, metals (i.e., radionuclides) adsorb tightly within the soil matrix. Natural soil forming processes, such as translocation of metals downward through the soil matrix, occur slowly. This process is initiated when precipitation infiltrates the surface and migrates downward. The installation of an asphalt cap (a semi-impermeable barrier) would retard these natural processes. In addition the presence of a cap would reduce the exposure of human or ecological receptors to direct radiation. This is not a reduction in toxicity, but a barrier to an exposure pathway like the reduction of mobility.

The reduction in radionuclide concentrations by natural processes is considered negligible. The contaminant concentrations would remain constant; however, they would be inaccessible to human and ecological receptors, thereby mitigating related risks. The capping alternative would not satisfy the statutory preference for treatment as a principal element of a remedial alternative.

Short-term Effectiveness— This alternative requires minimal intrusive activities, therefore, no significant environmental risks to onsite workers, the community, and the environment are expected during the implementation of this remedial action in the short-term. During the site preparation and cap installation activities, the risks to onsite workers from soil contaminated with radionuclides would be mitigated and addressed in a health and safety plan. Because the Painesville site only supports a few common species, implementation of this remedial alternative would have no significant harmful effect on the ecological resources. The implementation of this remedial alternative could be conducted in a timely manner, with an estimated duration of three to four months.

Implementability—This alternative would use standard construction techniques, such as soil compaction and placement, grading, and revegetation. No special equipment is anticipated for construction of the caps. The materials necessary to implement this alternative are readily available and vendors could be easily secured. The use of an asphalt cap is a reliable method to eliminate potential contaminant exposures; these barriers have been effective at other sites. Furthermore, site personnel and/or vendors can readily complete inspection and maintenance of the caps.

Periodic inspection, maintenance and environmental monitoring would be required following completion of this alternative to ensure protection of human health and the environment. Land use controls on the property would continue until further remedial actions are performed. Should the asphalt and underlying soil be removed in the future, special precautions during excavation, handling, and disposal activities would be necessary.

All remedial activities at the Painesville site would be coordinated with EPA Region 5 and State and local government authorities. Active communications would be maintained with the public, local media, EPA, and State and local officials throughout the remedial action.

Cost—The total estimated cost, using a 7% discount factor, for this alternative is $2,606,000. The cost assumptions and details for this alternative are provided in Appendix H. A table of discounted and non discounted costs for the alternatives is presented in Table 7.2.

State Acceptance—This criterion will be addressed in the ROD once comments on the RI/FS report and proposed plan have been received.

Community Acceptance—This criterion will be addressed in the ROD once comments on the RI/FS report and proposed plan have been received.

7.3 ALTERNATIVE 3—EXCAVATION AND OFF-SITE DISPOSAL

This alternative involves the complete excavation of soil, containing radionuclides at concentrations above a, subsistence farmer, SOR of 1, and off-site disposal.

Site preparation would be required prior to the excavation activities, including clearing obstacles that would interfere with the implementation of this alternative, identification of existing utilities, and installation of erosion and sediment controls to mitigate the off-site migration of potentially contaminated soil. In addition, dust suppression would be implemented as needed to protect the workers and minimize airborne migration of radionuclides. Site access restrictions and environmental monitoring (air and surface water) would be maintained throughout the remedial action.

Soil contaminated with radionuclides above the Action Level would be excavated from Areas A, B, C, D, G, and the Rubble Pile area. It is estimated that approximately 4,100 cubic yards of soil would be removed. The excavated material would be containerized and transported to an off-site disposal facility licensed and/or permitted to accept the radiological waste. Radiological screening and confirmatory sampling would be performed in the excavation areas to confirm that the radionuclide concentrations in the remaining soil are lower than the Action Level. For estimation purposes, it was assumed that one confirmation soil sample would be collected every 20 feet along the walls and bottom of the excavation. All samples would be analyzed for the COCs (Ra-226, Th-230, and U-238).

After completion of the remedial alternative, the excavated areas would be backfilled with clean fill. It was assumed that top soil and a vegetative cover would be installed on top of the clean fill. The total site area effected by this alternative would be approximately 75,000 square feet (8,333 square yards). No monitoring or land-use controls would be implemented as part of this alternative. Following completion of the remedial action, the site would be released for unrestricted land use.

Overall Protection of Human Health and the Environment—This alternative would provide adequate protection of human health and the environment for a subsistence farmer future use scenario. Potential human and ecological exposure risks would be reduced in the long-term because the impacted soil would be removed from its present location and transported to an off-site facility for disposal. Dose and risk estimates for the excavation alternative, by EU and receptor are presented in Appendix I. These calculations show that the excavation alternative would provide adequate protection to industrial or subsistence farmer receptors. The ecological risk assessment found no unacceptable risk to the environment. Risk and dose estimates were calculated for year 0 and for year 1000. The highest dose seen for the industrial receptor exposed to soil 0 to 2 feet below land surface following the excavation alternative was 1 mrem/yr in EU 2 at year 1,000. The highest dose seen for the residential receptor exposed to soil 0 to10 feet below land surface following the excavation alternative was 2 mrem/yr in EU 2 at year 1,000. The highest dose to the subsistence farmer was 7.4 mrem/yr for exposure to soil 0 to 10 feet below the ground surface in EU 2 at year 1,000.

Possible short-term environmental impacts associated with this alternative include the generation of airborne dust particles and/or release of surface water and sediment during the excavation activities. Standard construction procedures would be incorporated into the remedial design to ensure that appropriate erosion and dust control measures are implemented during the execution of this remedial alternative.

Compliance with Applicable or Relevant and Appropriate Requirements—The excavation process would ensure that all contaminated materials exceeding the action levels are removed and disposed of at a licensed and/or permitted off-site disposal facility. Action levels define the concentrations of contaminants that have been shown to satisfy the ARAR. In addition to the material known to exceed the action levels excavation would include a roughly 20% over excavation for constructability. This achieves exposures as low as reasonably achievable (ALARA). Following completion of this remedial alternative, the site could be released for use without radiological restrictions.

Long-term Effectiveness and Permanence—Soil contaminated with radionuclides above the Action Levels would not remain within the boundary of the Painesville site after the implementation of this alternative. This alternative would permanently eliminate contaminant concentrations posing unacceptable human and ecological risks at the site. In addition, no long-term controls would be required for this remedial alternative. However a failure in the off-site facility's containment controls might pose risks to human health and the environment surrounding the disposal facility. A liability for future impacts to human health and the environment exists in the event of a failure in the containment controls.

Reduction of Toxicity, Mobility, or Volume through Treatment— No treatment would be undertaken to reduce the toxicity or volume of the contaminants. The mobility of the contaminants would be reduced because the soil would be contained in an engineered facility designed for permanent disposal. This alternative would not satisfy the statutory preference for treatment as a principal element of a remedial alternative.

Short-term Effectiveness—Environmental risks to onsite workers, the community, and the environment during the implementation of this alternative would be mitigated. During the excavation and transportation activities, proper health and safety precautions and soil handling procedures would be implemented to reduce risks to onsite workers. Good engineering practices would be used to minimize dust generation and off-site migration of potentially contaminated surface water and sediment. Environmental risks to the community are minimal and are mainly due to the transportation of contaminated soil on public roads. Because the Painesville site only supports a few common species, implementation of this remedial alternative would have no significant harmful effect on the ecological resources. The implementation of this remedial alternative could be conducted in a timely manner, with an estimated duration of 4 to 5 months.

Implementability—This alternative is technically and administratively feasible to implement. The alternative requires the use of common equipment, materials, and supplies. Excavation, compaction, grading, and revegetation equipment and vendors are readily available. No special construction or excavation techniques are required.

This alternative would satisfy the State's remedial requirements and, therefore, would present no administrative feasibility concerns. In addition, no administrative issues are anticipated with respect to the off-site disposal of the impacted material. All remedial activities at the Painesville site would be coordinated with EPA Region V and State and local government authorities. Active communications would be maintained with the public, local media, EPA, and State and local officials throughout the remedial action.

Cost—The total estimated cost, using a 7% discount factor, for this alternative is $5,145,000. The cost assumptions and details for this alternative are provided in Appendix H. A table of discounted and non discounted costs for the alternatives is presented in Table 7.2.

State Acceptance—This criterion will be addressed in the ROD once comments on the RI/FS report and proposed plan have been received.

Community Acceptance—This criterion will be addressed in the ROD once comments on the RI/FS report and proposed plan have been received.

7.4 ALTERNATIVE 4—LIMITED EXCAVATION AND OFF-SITE DISPOSAL

This alternative involves the excavation of soil containing radionuclides which exceed an industrial SOR of 1 and off-site disposal.

Site preparation would be required prior to the excavation activities, including clearing obstacles that would interfere with the implementation of this alternative, identification of existing utilities, and installation of erosion and sediment controls to mitigate the off-site migration of potentially contaminated soil. In addition, dust suppression would be implemented as needed to protect the workers and minimize airborne migration of radionuclides. Site access restrictions and environmental monitoring (air and surface water) would be maintained throughout the remedial action.

Soil contaminated with radionuclides and exceeding an industrial SOR of 1 would be excavated from Areas A, B, C, D, G, and the Rubble Pile area. It is estimated that approximately 702 cubic yards of soil would be removed. The excavated material would be containerized and transported to an off-site disposal facility licensed and/or permitted to accept the radiological waste. Radiological screening and confirmatory sampling would be performed in the excavation areas to confirm that the radionuclide concentrations in the remaining soil are lower than the Action Level. For estimation purposes, it was assumed that one confirmation soil sample would be collected every 20 feet along the walls and bottom of the excavation. All samples would be analyzed for the COCs (Ra-226, Th-230, and U-238).

After completion of the remedial alternative, the excavated areas would be backfilled with clean fill. It was assumed that top soil and a vegetative cover would be installed on top of the clean fill. The total site area effected by this alternative would be approximately 13,600 square feet (1,511 square yards). No monitoring would be implemented as part of this alternative. Following completion of the remedial action, the site would be released for industrial land use only. Land use controls would be needed to ensure that the site remained industrial use only.

Overall Protection of Human Health and the Environment—This alternative would provide adequate protection of human health and the environment for an industrial future use scenario. Potential human and ecological exposure risks would be reduced in the long-term because the impacted soil would be removed from its present location and transported to an off-site facility for disposal. Dose and risk estimates for the excavation alternative, by EU are presented in Appendix I. These calculations show that the partial excavation alternative would provide adequate protection to industrial receptors. The ecological risk assessment found no unacceptable risk to the environment. Risk and dose estimates were calculated for year 0 and for year 1000. The highest dose seen for the industrial receptor exposed to soil 0-2 feet below land surface following this excavation alternative was 6 mrem/yr in EUs 2 and 4 at year 1000. Doses to other receptors would be controlled by imposition of land use controls.

Possible short-term environmental impacts associated with this alternative include the generation of airborne dust particles and/or release of surface water and sediment during the excavation activities. Standard construction procedures would be incorporated into the remedial design to ensure that appropriate erosion and dust control measures are implemented during the execution of this remedial alternative.

Compliance with Applicable or Relevant and Appropriate Requirements—The excavation process would ensure that all contaminated materials exceeding the industrial SOR of 1 are removed and disposed of at a licensed and/or permitted off-site disposal facility. Action levels define the concentrations of contaminants that has been shown to satisfy the ARARs. In addition to the material known to exceed the action levels excavation would include a roughly 20% over excavation for constructability. This achieves exposures as low as reasonably achievable (ALARA). Following completion of this remedial alternative, the site would meet the release requirements for restricted industrial use with the implementation of land use controls and possibly the acquisition of a state license.

Long-term Effectiveness and Permanence—Soil exceeding the industrial SOR would not remain within the boundary of the Painesville site after the implementation of this alternative. This alternative would permanently eliminate contaminant concentrations posing unacceptable human risk in an industrial setting. However a failure in the off-site facility's containment controls might pose risks to human health and the environment surrounding the disposal facility. A liability for future impacts to human health and the environment exists in the event of a failure in the containment controls of the disposal facility.

Reduction of Toxicity, Mobility, or Volume through Treatment—No treatment would be undertaken to reduce the toxicity or volume of the contaminants. The mobility of the contaminants would be reduced because the soil would be contained in an engineered facility designed for permanent disposal. This alternative would not satisfy the statutory preference for treatment as a principal element of a remedial alternative.

Short-term Effectiveness—Environmental risks to onsite workers, the community, and the environment during the implementation of this alternative would be mitigated. During the excavation and transportation activities, proper health and safety precautions and soil handling procedures would be implemented to reduce risks to onsite workers. Good engineering practices would be used to minimize dust generation and off-site migration of potentially contaminated surface water and sediment. Environmental risks to the community are minimal and are mainly due to the transportation of contaminated soil on public roads. Because the Painesville site only supports a few common species, implementation of this remedial alternative would have no significant harmful effect on the ecological resources. The implementation of this remedial alternative could be conducted in a timely manner, with an estimated duration of 4 to 5 months.

Implementability—This alternative is technically and administratively feasible to implement. The alternative requires the use of common equipment, materials, and supplies. Excavation, compaction, grading, and revegetation equipment and vendors are readily available. No special construction or excavation techniques are required.

This alternative presents one administrative feasibility concern. The imposition of future land use restrictions would have to be agreed to by the current land owner and the state. No administrative issues are anticipated with respect to the off-site disposal of the impacted material. All remedial activities at the Painesville site would be coordinated with EPA Region V and State and local government authorities. Active communications would be maintained with the public, local media, EPA, and State and local officials throughout the remedial action.

Cost—The total estimated cost, using a 7% discount factor, for this alternative is $1,632,000. The cost assumptions and details for this alternative are provided in Appendix H. A table of discounted and non discounted costs for the alternatives is presented in Table 7.2.

State Acceptance—This criterion will be addressed in the ROD once comments on the RI/FS report and proposed plan have been received.

Community Acceptance—This criterion will be addressed in the ROD once comments on the RI/FS report and proposed plan have been received.

Table 7.2 Non-Discounted and Discounted Costs for Alternatives

Activity	Non Discounted Cost in Thousands, $FY2002			Discounted[2] Cost in Thousands, $FY2002		
	Alt 2 Asphalt Cap In Place	Alt 3 Subsistence Farmer Removal Criteria	Alt 4 Industrial Worker Removal Criteria	Alt 2 Asphalt Cap In Place	Alt 3 Subsistence Farmer Removal Criteria	Alt 4 Industrial Worker Removal Criteria
HTRW REMEDIAL ACTION	**2,218**	**5,145**	**1,404**	**2,218**	**5,145**	**1,404**
Remedial Action	1,441	3,977	800	1,441	3,977	800
Monitoring, Sampling, & Analysis	97	316	112	97	316	112
Land Use Controls	125	0	98	125	0	98
Site Supervisory Labor	274	482	184	274	482	184
Home Office Support	281	370	210	281	370	210
HTRW O&M	**27,805**	**0**	**29,260**	**388**	**0**	**228**
Inspections	11,267	0	15,600	155	0	91
Land Use Controls	10,328	0	9,644	148	0	115
Five Year reviews	2,308	0	4,016	29	0	22
Maintenance	3,902	0	0	56	0	0
TOTAL RA AND O&M TOTAL (1)	**30,023**	**5,145**	**30,664**	**2,606**	**5,145**	**1,632**

(1) Includes project overhead, profit, and owner cost
(2) Costs discounted at 7% per year.

8.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents the comparative analysis for the Painesville FS alternatives. The analysis evaluates the performance of each alternative relative to each specific criterion. This analysis differs from the analysis in Section 7 in which each alternative was analyzed independently without consideration of the other alternatives. The purpose of this analysis is to identify the advantages and disadvantages of each alternative relative to one another. The modifying criteria, State and Community Acceptance, will not be addressed in this analysis because they will be evaluated in the ROD once comments on the RI/FS report and proposed plan have been received.

Ra-226, Th-230, and U-238 were identified as the COCs at the Painesville site. To address contamination from these COCs, four remedial alternatives were evaluated in the comparative analysis. These alternatives are as follows:

Alternative 1 – No Action
Alternative 2 – Capping of Contaminated Soils In-Place (Asphalt Cap)
Alternative 3 – Excavation and Off-site Disposal.
Alternative 4 – Limited Excavation and Disposal.

The comparative analysis of these alternatives is presented below. A summary of this analysis is presented in Table 8.1. The area and volume of impacted soils are shown in Figures 8.1 to 8.5 for Industrial (Fig 8.1 & 8.2) and Subsistence Farmer (Fig. 8.3-8.5) scenarios.

8.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The no action alternative does not provide adequate protection of human health and the environment. The no action alternative does not include any actions and consequently is not expected to provide protection of human health and the environment against potential exposure to soil contaminated with radionuclides.

Alternative 2 provides good protection of human health and the environment, for an industrial use scenario, through the containment of soil contaminated with radionuclides and the reduction of exposure pathways. The alternative would provide shielding to reduce radiation exposures minimizing the potential risks to onsite workers and the public. However, the COCs would remain within the boundaries of the Painesville site and a failure in the containment controls might pose risks to human health and the environment surrounding the facility. A potential for future impacts to human health and the environment exists in the event of a failure in the containment controls.

Alternative 3 provides the best protection of human health and the environment for the site because the impacted soil would be removed from its present location and transported to an off-site facility for disposal. The alternative provides protectiveness for a subsistence farmer future use scenario. However, contaminants removed from the Painesville site would not be treated and a failure in the off-site facility's containment controls might pose risks to human health and the environment surrounding the disposal facility. The selected facility will be a licensed/permitted facility. Issues pertaining to risk from failure of containment will have been addressed by the facilities permit or Environmental Impact Statement. A potential for future impacts to human health and the environment exists in the event of a failure in the containment controls.

Alternative 4 provides good protection of human health and the environment for the site because the impacted soil, that could cause a dose to an industrial worker exceeding the ARAR, would be removed from its present location and transported to an off-site facility for disposal and impacts to other receptors would be limited by land use controls and possibly a state license. However, contaminants removed from the Painesville site would not be treated and a failure in the off-site facility's containment controls might pose risks to human health and the environment surrounding the disposal facility. The selected facility will be a licensed/permitted facility. Issues pertaining to risk from failure of containment will have been addressed by the facilities permit or Environmental Impact Statement. A potential for future impacts to human health and the environment exists in the event of a failure in the containment controls.

8.2 COMPLIANCE WITH ARARS

Alternative 1, no action, would not meet the 10 CFR 20 and OAC 3701-1-38 cleanup criteria (25mrem/yr) proposed by USACE to address radionuclide contamination in soil at the Painesville site.

Alternative 2, capping of contaminated soils in-place, would comply with ARARs. Impacted materials exceeding the action levels would be capped with one foot thickness of asphalt minimizing the exposure to the COCs in soil. This alternative would reduce the dose limit below the guideline of 25 mrem/yr. The capped areas would require long-term monitoring and maintenance and implementation of land use controls and a possible license from the state would be required to ensure that the contaminated areas are not disturbed by current or future land owners.

Alternative 3, excavation and off-site disposal, would comply with ARARs. Impacted materials exceeding the Action Levels would be removed from Areas A, B, C, D, G, and the rubble pile and disposed of at a licensed and/or permitted off-site disposal facility. It is anticipated that this alternative would reduce the dose limit below the guideline of 25 mrem/yr. Following completion of Alternative 3, the Painesville site would meet the requirements for release without radiological restrictions.

Alternative 4, limited excavation and disposal, would meet the ARAR for industrial use of the site but not for subsistence farmer. Impacted materials exceeding the industrial SOR of 1 would be removed from Areas A, B, C, D, G, and the rubble pile and disposed of at a licensed and/or permitted off-site disposal facility. It is anticipated that this alternative would reduce the dose limit below the guideline of 25 mrem/yr. Land use controls limiting the site to industrial uses would need to be imposed.

8.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Among the three alternatives, Alternative 3 provides the best long-term effectiveness and permanence. Impacted soil exceeding a subsistence farmer SOR of 1 would be excavated and removed from the Painesville site. At the completion of this alternative the soil within the site would contain radionuclide concentrations below the action levels. In addition, there would not be any post-remedial actions (i.e., monitoring and maintenance) or land use controls associated with this alternative.

Alternative 4 would be as effective as Alternative 3, provided that the site remains an industrial facility. Impacted soil exceeding an industrial SOR of 1 would be excavated and removed from the Painesville site. At completion of this alternative the soil within the site would contain radionuclide concentrations below the action levels. After the completion of this alternative the implementation of land use controls would be required. If land use controls are not maintained, the goal of long-term effectiveness can not be assured.

Alternative 2 would be less effective than Alternative 3. This alternative would eliminate the pathways to the contamination, however, the radionuclides would remain within the boundaries of the Painesville site. After the completion of this alternative, long-term monitoring and maintenance would be required, as well as the implementation of land use controls. If the land use controls and maintenance activities are not maintained, the goal of long-term effectiveness can not be assured.

Alternative 1 is not effective since no actions are implemented under this alternative.

8.4 REDUCTION IN TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

None of the alternatives use treatment to reduce toxicity, mobility or volume of the contaminants.

The No Action alternative would have no effect on the toxicity, mobility, or volume of the contaminant.

8.5 SHORT-TERM EFFECTIVENESS

Alternative 1 does not present any risk to the community, environment, or site workers during its implementation since no actions are associated with this alternative.

Alternative 2, (capping of contaminated soils in-place) requires minimal intrusive activities, therefore, no significant short-term risks to onsite workers, the community, or the environment are expected during the implementation of this alternative. During site preparation and the asphalt cap installation activities, risks to onsite workers from soil contaminated with radionuclides would be mitigated and addressed in a health and safety plan. This alternative provides the greatest measure of short-term effectiveness and generates the least short-term risks.

Environmental risks to onsite workers, the community, and the environment during the implementation of Alternative 3 may occur due to the operation of heavy equipment, on-site excavation, and construction activities. Disturbed areas would be more likely to experience wind and water erosion. These temporary effects could be minimized by limiting the area disturbed at any time during excavation operations and by employing good engineering practices (e.g., sediment barriers to minimize the amount of sediment leaving the work area and containment of surface water during storms). In addition, this alternative would create an added risk to the community due to the transportation of contaminated soil on public roads or on railroads.

Environmental risks to onsite workers, the community, and the environment during the implementation of Alternative 4 would be similar to Alternative 3 but reduced due to the lesser volume of excavated soil.

With the exception of the long-term monitoring and maintenance component, all alternatives are anticipated to take less than one year to implement.

8.6 IMPLEMENTABILITY

The No Action alternative would be the easiest to implement since it involves no remedial actions. Among the three remaining alternatives, Alternative 3 would be the next easiest to implement. This alternative requires the use of common equipment, materials, and supplies. Excavation, compaction, grading, and revegetation equipment and vendors are readily available. In addition, no special construction or excavation techniques are required. No administrative feasibility issues are anticipated with respect to the commercial disposal of the impacted soil generated under this alternative. Furthermore, long-term monitoring and maintenance would not be required following completion of this remedial action.

Alternative 4 would be technically easy to implement, land use controls to restrict utilization of the site to industrial use could pose some administrative implementability concerns.

Alternative 2 would be difficult to implement. The materials necessary to complete this alternative are readily available and vendors could be easily secured. In addition, no special construction or excavation techniques are required. Periodic inspection and maintenance and environmental monitoring would be required following completion of this alternative to ensure protection of human health and the environment. However, the imposition of land use controls on the property could be difficult.

8.7 COST

Table 8.1 presents the total cost for each alternative evaluated in the comparative analysis and Figures 8.1 to 8.5 present the footprint and depth of excavation. As shown in this table, Alternative 3 has the highest estimated cost. Alternative 4 has the lowest estimated cost to complete. Alternative 2 would be less costly than Alternative 3, but more costly than Alternative 4. All alternatives using disposal assume disposal at a Class C landfill where the license permits the radiological component to be disposed.

Table 8.1. Comparative Analysis of Remedial Alternatives for the Painesville Site Painesville, Ohio

Remedial Alternative	Evaluation Criteria								
	Threshold		*Balancing*					*Modifying*	
	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-term Effectiveness and Permanence	Reduction in Toxicity, Mobility, or Volume Through Treatment	Short-term Effectiveness	Implementability	Total Alternative Cost*	State Acceptance	Community Acceptance
No Action	○	○	○	○	○	●	$ 0	TBE	TBE
Capping of Contaminated Soils In-Place (Asphalt Cap)	●	◙	◉	○	◙	⊙	$ 2,606,000	TBE	TBE
Excavation and Off-site Disposal	●	●	●	○	◉	●	$ 5,145,000	TBE	TBE
Partial Excavation and Off Site Disposal	◉	◙	◙	○	◉	◙	$ 1,632,000	TBE	TBE

Ranking Key: ● High ◙ High-Moderate ◉ Moderate ⊙ Moderate-Low ○ Low

TBE = To Be Evaluated After Review of RI/FS and Proposed Plan

* Costs are presented as discounted cost using a 7% discount factor.

9.0 CONCLUSIONS

In determining the potential remedial alternatives the universe of technology types and process options that are potentially applicable for remediating the media (i.e., soils) and constituents of concern were identified. These are organized into General Response Actions including no action, limited actions, treatment, containment, removal, and disposal.

In the initial screening phase, the technology types and process options were evaluated on the basis of technical implementability. Technical implementability is determined based on the following criteria: site characteristics, contaminant characteristics, and technology development. Because an EE/CA has already been generated for the site many technologies that were inappropriate were screened out at that time.

Technology processes considered to be implementable were assessed in greater detail before selecting at least one process to represent each technology type. One representative process was selected to facilitate the alternative evaluation and provide a basis for developing preliminary designs.

The selected technology processes were subjected to detailed screening using three major criteria: effectiveness, implementability, and cost. Of these criteria, effectiveness was the most important. Implementability and cost were factored into the assessment to determine the final screening decision as to whether the process option was retained. It is important to note that at this stage of the analysis these criteria were applied to the technologies within the general response actions they are intended to satisfy and not to the site as a whole.

Alternatives were developed using the technologies remaining after the detailed screening. Four alternatives were presented for remediation: No Action, Capping, Excavation and Disposal, and Limited Excavation and Disposal.

Under the no action alternative, no additional remedial action would be taken at the Painesville site. The current and future land owners would continue to maintain the site controls to verify that no significant changes in site conditions occur.

The capping alternative combines the installation of an asphalt cap with land use controls and environmental monitoring. Impacted soil exceeding the preliminary remediation goals would be covered in-place by a one-foot thick asphalt cap.

Two excavation and disposal alternatives involve the excavation of impacted soil exceeding a SOR of 1, off-site transportation, and disposal of the soil at a commercial facility licensed and/or permitted to accept radiological waste. Excavated areas would be backfilled with clean soil, graded, and re-vegetated. The two alternatives differ in that one uses the SOR calculated based on a subsistence farmer use for the site and the other uses an SOR based on a future industrial use. Following completion of the remedial action, the site would meet the requirements for unrestricted use for the subsistence farmer case and for industrial use only for the industrial case.

Section 300.430 (e) of the NCP lists nine criteria by which each remedial alternative must be assessed. The acceptability and performance of each alternative against the criteria is evaluated individually so that relative strengths and weaknesses may be identified. The criteria are:

- overall protection of human health and the environment;
- compliance with applicable or relevant and appropriate requirements;
- long-term effectiveness and permanence;

- reduction of toxicity, mobility, or volume through treatment;
- short-term effectiveness, implementability, and cost;
- state acceptance and community acceptance.

The following is a summary of the criteria indicating which alternative best satisfies that criteria. The criteria, State and Community Acceptance, will not be addressed in this analysis because they will be evaluated in the ROD once comments on the RI/FS report and Proposed Plan (PP) have been received.

Overall Protection of human health and the Environment: Alternative 3 provides the best protection of human health and the environment for the site because the impacted soil would be removed from its present location and transported to an off-site facility for disposal.

Compliance with ARARs: Alternatives 2, 3, and 4 will comply with ARARs. Following completion of Alternative 3, the Painesville site would meet the requirements for release without radiological restrictions. Alternatives 2 and 4 would require land use controls to be implemented.

Long-Term Effectiveness and Permanence: Among the three alternatives, the Excavation and Off-site Disposal alternative (Alternative 3) provides the best long-term effectiveness and permanence. Impacted soil exceeding a subsistence farmer land use SOR of 1 would be excavated and removed from the Painesville site. In addition, there would not be any post-remedial actions (i.e., monitoring and maintenance) or land use controls associated with this alternative.

Reduction in Toxicity, Mobility, or Volume through Treatment: None of the alternatives reduce toxicity, mobility or volume through treatment.

Short-Term Effectiveness: Alternative 2, (capping of contaminated soils in-place) requires minimal intrusive activities, therefore, no significant environmental risks to onsite workers, the community, and the environment are expected during the implementation of this alternative in the short-term. This alternative provides the greatest measure of short term effectiveness and generates the least short term risks.

With the exception of the long-term monitoring and maintenance component, all alternatives are anticipated to take less than one year in implementation time.

Implementability: Among the alternatives, Excavation and Off-site Disposal (Alternative 3) would be the easiest to implement both technically and administratively. This alternative requires the use of common equipment, materials, and supplies. Furthermore, long-term monitoring and maintenance would not be required following completion of this remedial action.

Cost: Alternative 4, limited excavation and off-site disposal, has the lowest estimated cost to complete.

Selection of a preferred alternative.

A preferred alternative will be selected in the Proposed Plan.

10.0 REFERENCES

DOD. 1996. *Remediation Technology Screening Matrix and Reference Guide* (Department of Defense Environmental Technology Transfer Committee), October, 1996. http://www.frtr.gov/matrix2/section3/table3_2.html.

EPA. 1998. *Field Application of In Situ Remediation Technologies: Chemical Oxidation*, September, 1998.

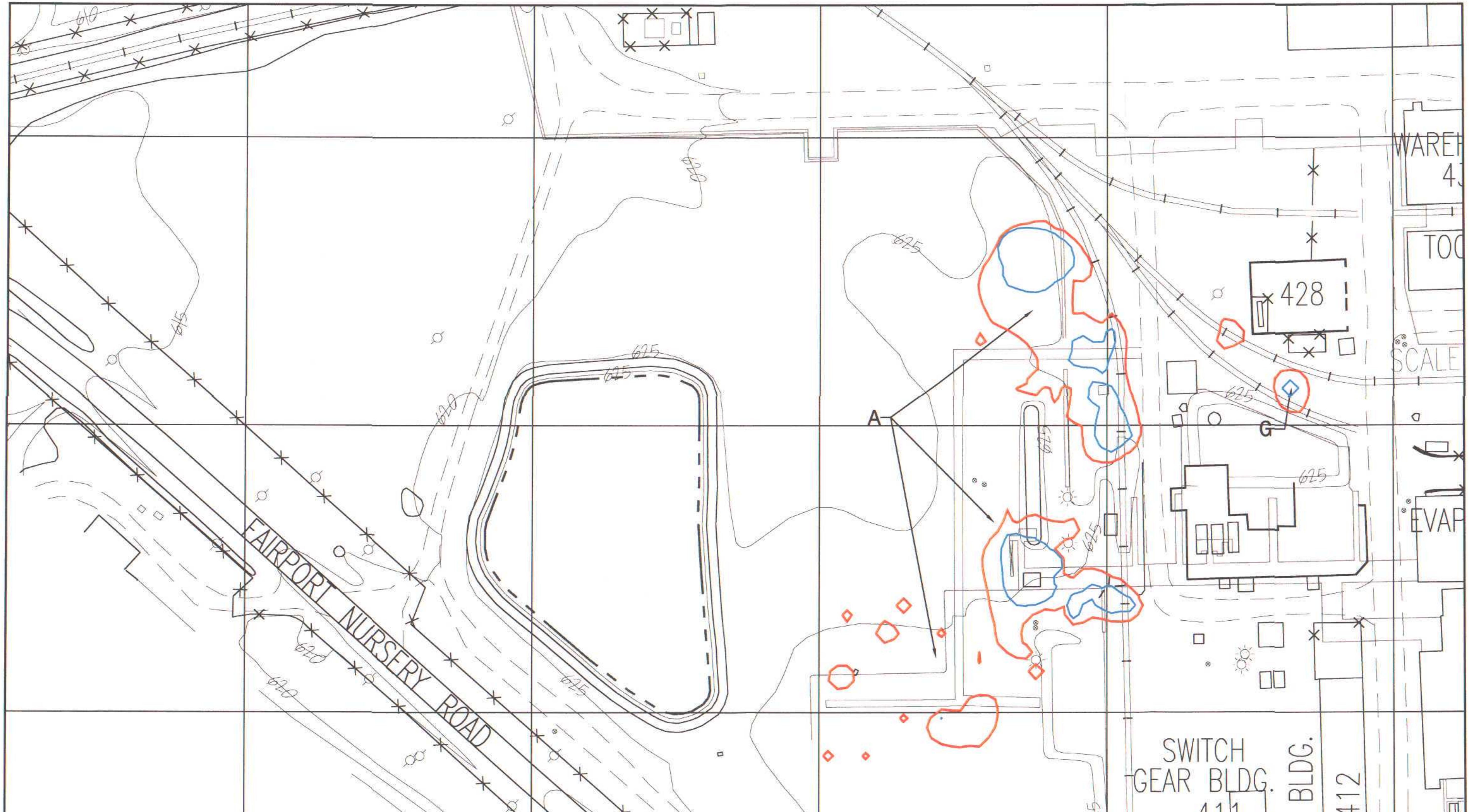
EPA 2000. *Institutional Controls: A Site Managers Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups.* EPA 540-F-00-005. OSWER 9355.0-74FS-P. September 2000.

Wentz, C.A. 1995. Hazardous Waste Management, McGraw Hill, Inc., 1995.

USACE, 1998a. Characterization Report for the Painesville site, May.

USACE 2000. *Off-site Disposal of Materials from the Formerly Utilized Sites Remedial Action Program,* U.S. Army Corps of Engineers Engineer Circular EC-200-1-3, January 2000.

FS Figures



BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
UTILITY LIGHT POLE

SUBSISTANCE FARMER AREA IDENTIFIER SOR >1 (Based on 1996–2000 Results)

INDUSTRIAL AREA IDENTIFIER SOR >1 (Based on 1996–2000 Results)

NOTE: All of the former Uniroyal Property Buildings except for the Administrative Building have been razed to their foundations.

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Area Impacted by Subsistence and Industrial Scenario Excavations, Areas A and G

Science Applications International Corporation — Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/10/03	AS SHOWN	08-4191-120	6.1

FIGURE 6.1-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 6.1.DWG DATE: MAY 05, 2003 TIME: 7:53 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

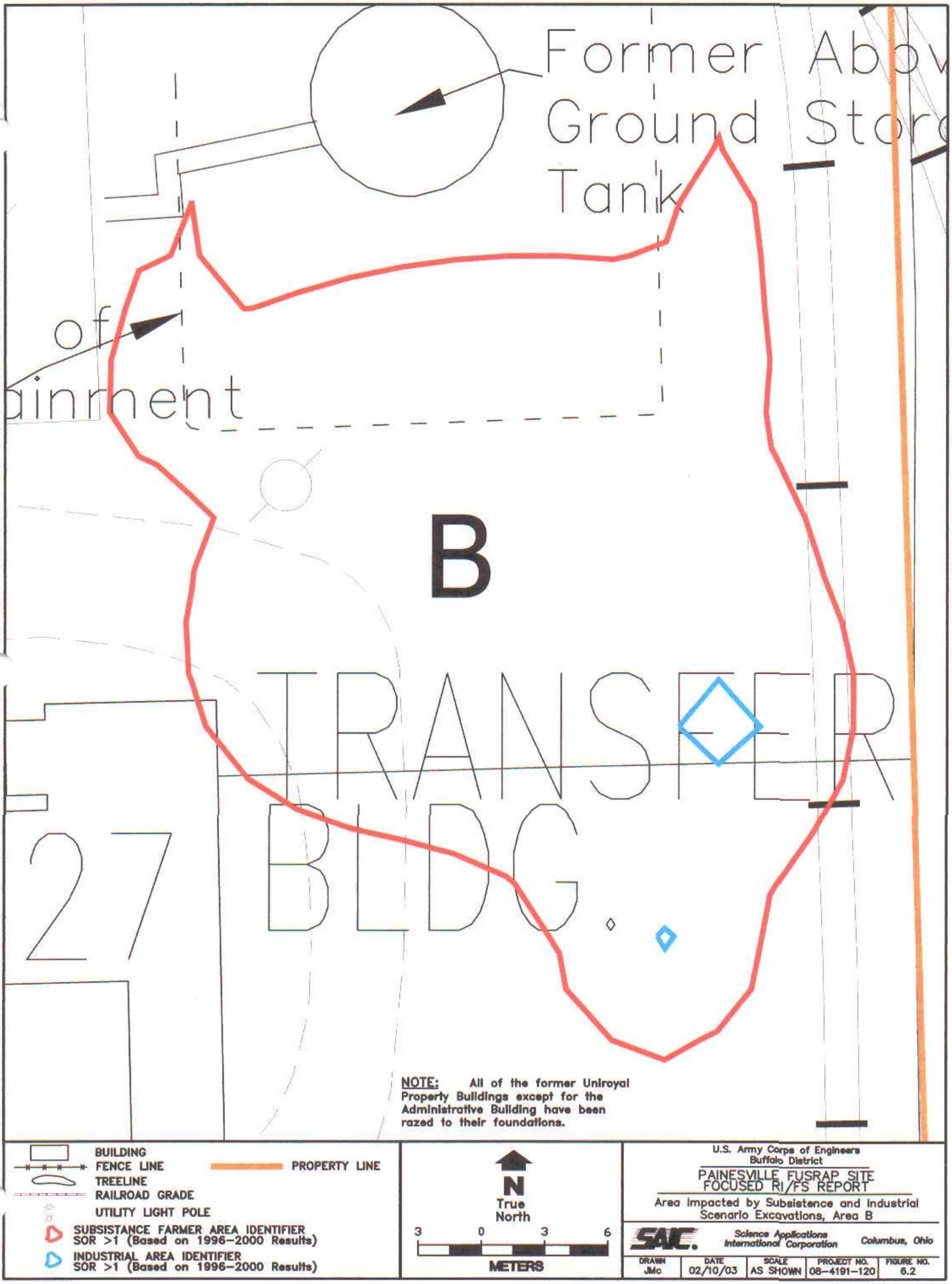


FIGURE 6.2-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 6.2.DWG DATE: 05, 2003 TIME: 8:02 AM CTB: S:\CTB PLOTTING\PAIN-RAD.CTB

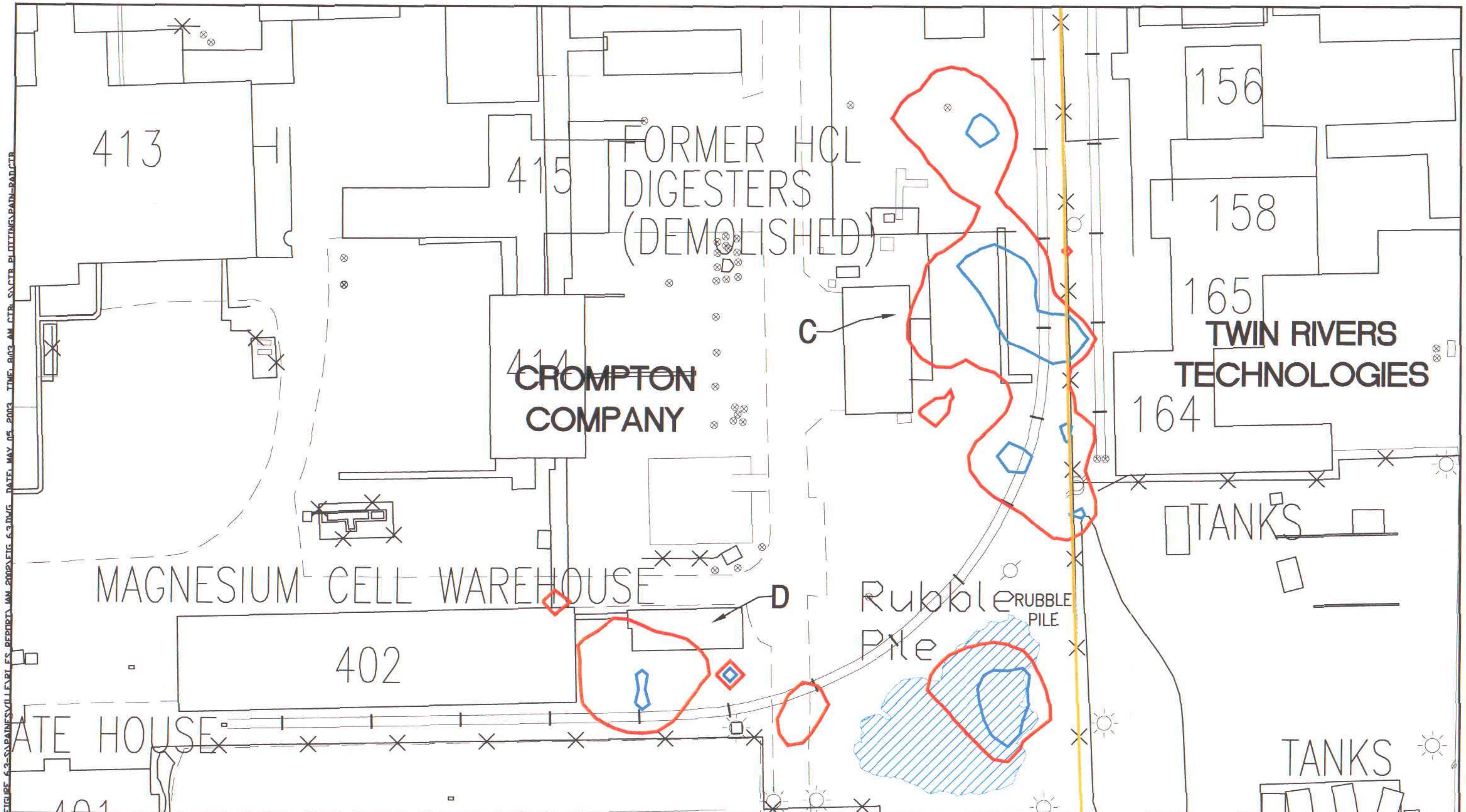
U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Area Impacted by Subsistence and Industrial Scenario Excavations, Area B

SAIC. Science Applications International Corporation — Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/10/03	AS SHOWN	08-4191-120	6.2



TREELINE
RAILROAD GRADE
UTILITY LIGHT POLE
BUILDING
FENCE LINE
PROPERTY LINE
SUBSISTANCE FARMER AREA IDENTIFIER
SOR >1 (Based on 1996–2000 Results)
INDUSTRIAL AREA IDENTIFIER
SOR >1 (Based on 1996–2000 Results)
LIMITS OF RUBBLE PILE.

NOTE: All of the former Uniroyal Property Buildings except for the Administrative Building have been razed to their foundations.

N
True
North

8 0 8 16
METERS

U.S. Army Corps of Engineers
Buffalo District

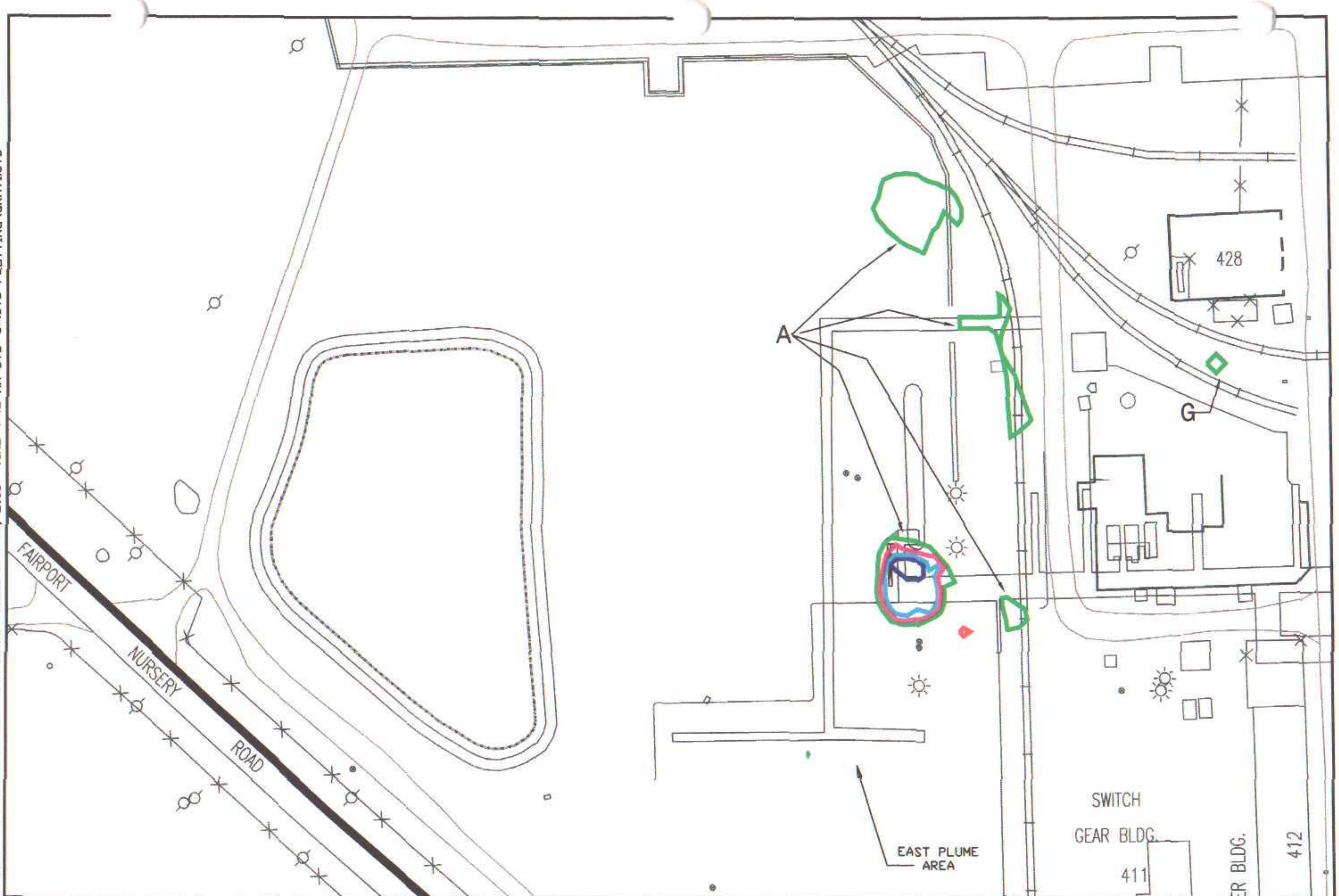
PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Area Impacted by Subsistence and Industrial Scenario Excavations, Areas C, D, and Rubble Pile

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO.
JMc	02/10/03	AS SHOWN	08-4191-102	6.3

FIGURE 6.3–S:\PAINESVILLE\RI_FS_REPORT_JAN_2002\FIG_6.3.DWG DATE: MAY 05, 2003 TIME: 8:03 AM CTB: S:\CTB_PLOTTING\PAIN-PAD.CTB



BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
DIRT ROAD
UTILITY LIGHT POLE
RUBBLE PILE LIMITS

0 TO 2 FOOT BOUNDARY AREA
2 TO 4 FOOT BOUNDARY AREA
4 TO 6 FOOT BOUNDARY AREA
6 TO 8 FOOT BOUNDARY AREA
8 TO 10 FOOT BOUNDARY AREA

NOTE: All of the former Uniroyal Property Buildings except for the Administrative Building have been razed to their foundations.

N True North

15 0 15 30
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

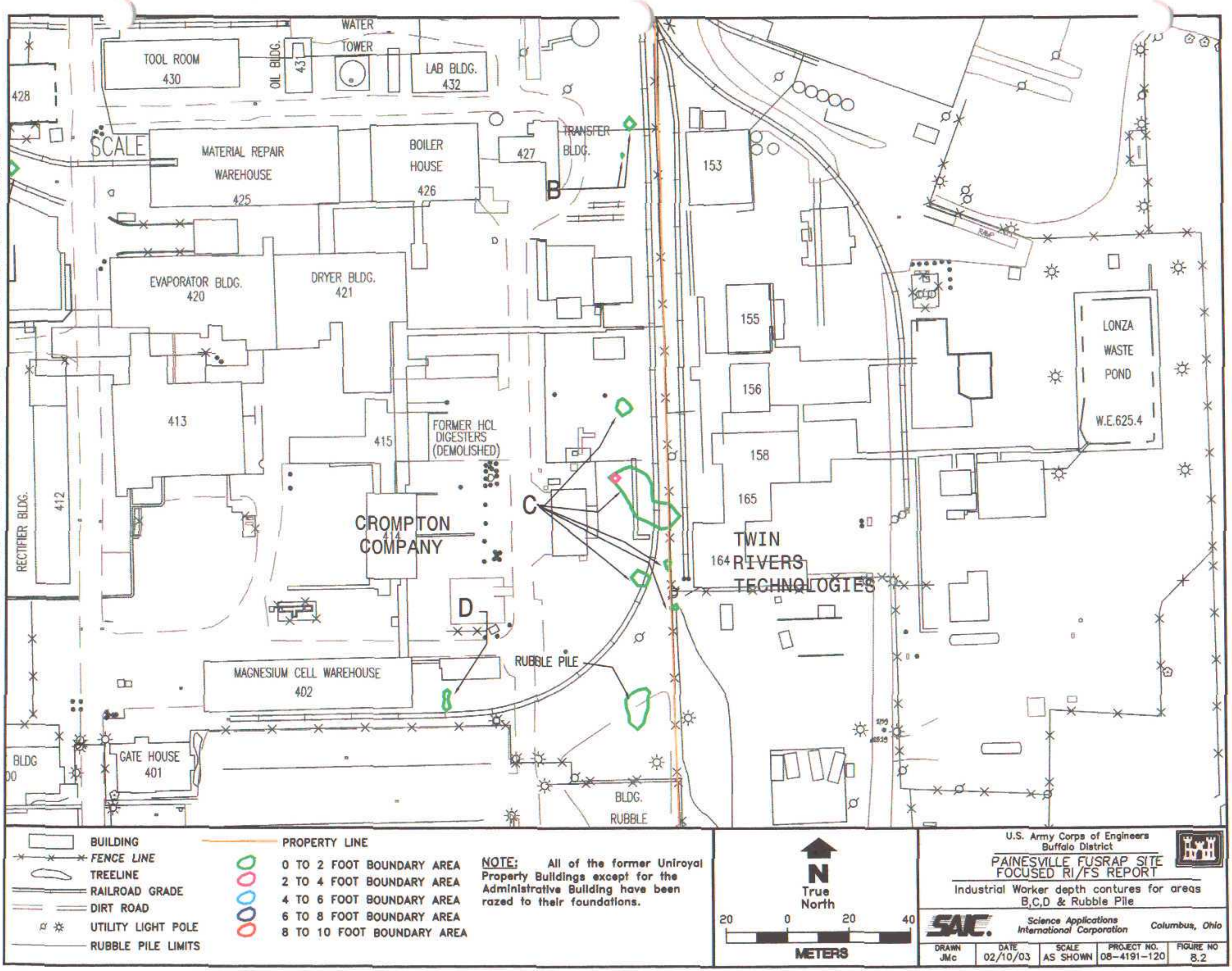
Industrial Worker depth contours for areas A & G

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO
JMc	02/10/03	AS SHOWN	08-4191-120	8.1

FIG 8.1-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 8.1.DWG DATE: MAY 05, 2003 TIME: 7:42 AM CTB: S:\CTB PLOTTING\GRAY1.CTB

FIG 8.2-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 8.2.DWG DATE: MAY 05, 2003 TIME: 7:36 AM CTB: S:\CTB PLOTTING\GRAY1.CTB



BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
DIRT ROAD
UTILITY LIGHT POLE
RUBBLE PILE LIMITS

0 TO 2 FOOT BOUNDARY AREA
2 TO 4 FOOT BOUNDARY AREA
4 TO 6 FOOT BOUNDARY AREA
6 TO 8 FOOT BOUNDARY AREA
8 TO 10 FOOT BOUNDARY AREA

NOTE: All of the former Uniroyal Property Buildings except for the Administrative Building have been razed to their foundations.

N
True
North

15 0 15 30
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

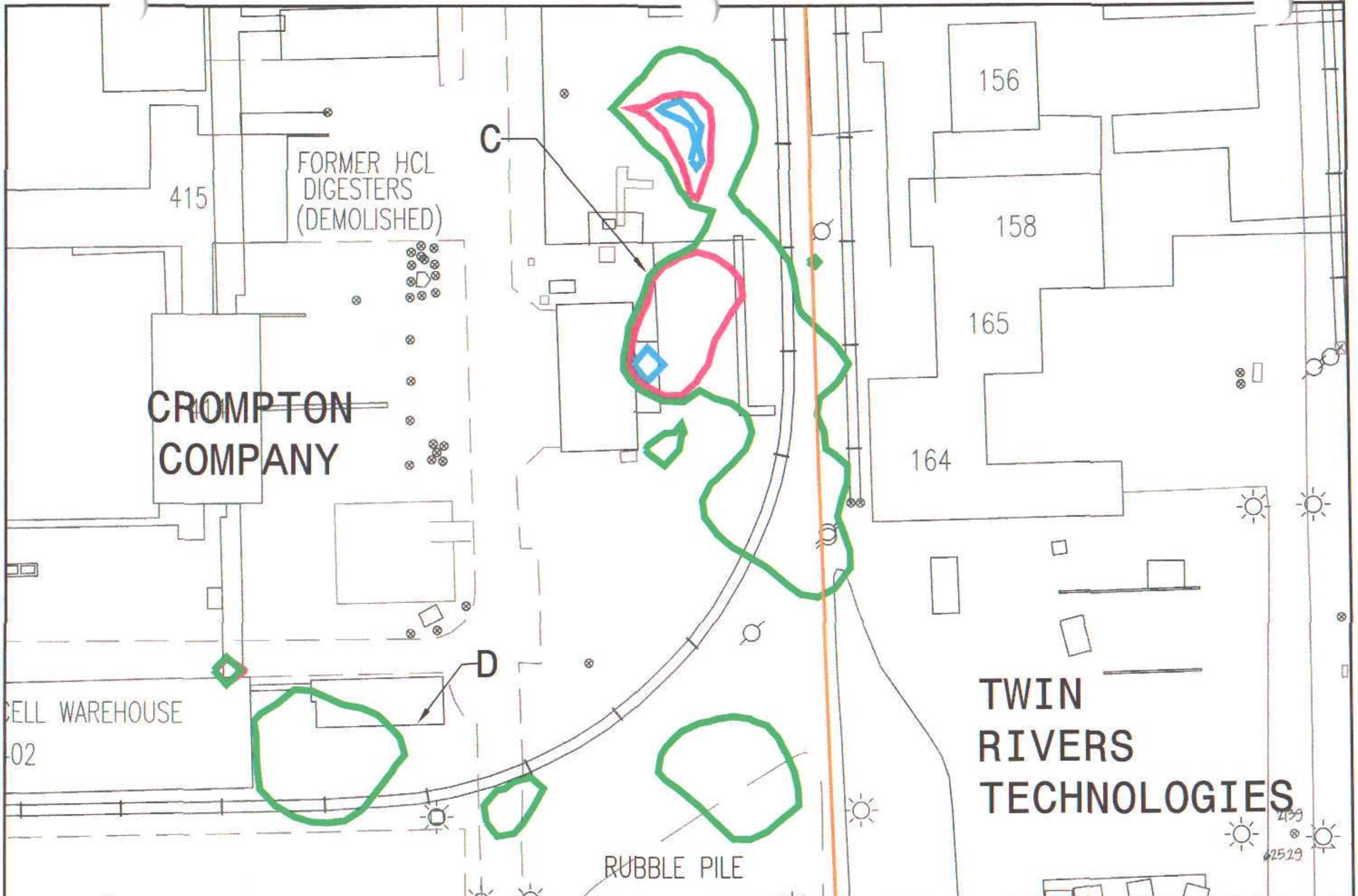
Subsistence Farmer depth
contours for areas A & G

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO
JMc	02/10/03	AS SHOWN	08-4191-120	8.3

FIG 8.3-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 8.3.DWG DATE: MAY 05, 2003 TIME: 7:50 AM CTB: S:\CTB PLOTTING\GRAY1.CTB

FIG 8.4-S:\PAINESVILLE\RI_FS_REPORT\JAN 2002\FIG 8.4.DWG DATE: MAY 05, 2003 TIME: 7:47 AM CTB: S:\CTB PLOTTING\GRAY1.CTB



BUILDING
FENCE LINE
TREELINE
RAILROAD GRADE
DIRT ROAD
UTILITY LIGHT POLE
RUBBLE PILE LIMITS

PROPERTY LINE
0 TO 2 FOOT BOUNDARY AREA
2 TO 4 FOOT BOUNDARY AREA
4 TO 6 FOOT BOUNDARY AREA
6 TO 8 FOOT BOUNDARY AREA
8 TO 10 FOOT BOUNDARY AREA

NOTE: All of the former Uniroyal Property Buildings except for the Administrative Building have been razed to their foundations.

N
True
North

10 0 10 20
METERS

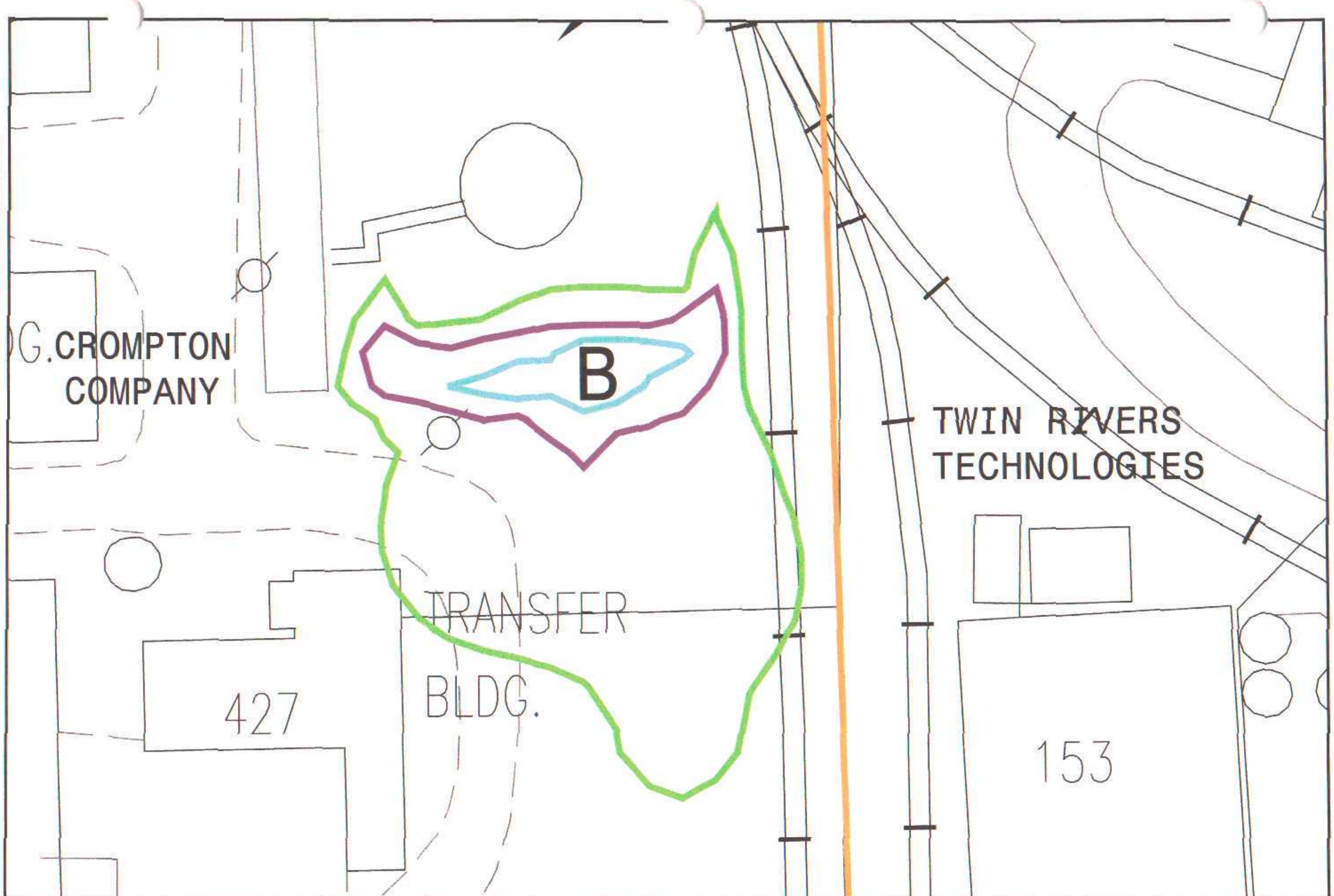
U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Subsistence Farmer depth contours for areas C D & Rubble Pile

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO
JMc	02/10/03	AS SHOWN	08-4191-120	8.4



	BUILDING
	PROPERTY LINE
	TREELINE
	RAILROAD GRADE
	DIRT ROAD
	UTILITY LIGHT POLE
	RUBBLE PILE LIMITS

0 TO 2 FOOT BOUNDARY AREA
2 TO 4 FOOT BOUNDARY AREA
4 TO 6 FOOT BOUNDARY AREA
6 TO 8 FOOT BOUNDARY AREA
8 TO 10 FOOT BOUNDARY AREA

NOTE: All of the former Uniroyal Property Buildings except for the Administrative Building have been razed to their foundations.

N
True North

5 0 5 10
METERS

U.S. Army Corps of Engineers
Buffalo District

PAINESVILLE FUSRAP SITE
FOCUSED RI/FS REPORT

Subsistence Farmer depth contours for area B

SAIC. Science Applications International Corporation Columbus, Ohio

DRAWN	DATE	SCALE	PROJECT NO.	FIGURE NO
JMc	02/10/03	AS SHOWN	08-4191-120	8.5

AREA AREA B-S:\PAINESVILLE\C084191\JULY 2002\SUBSISTENCE FARMER 0TO10'.DWG DATE: FEB 10, 2003 TIME: 2:27 PM CTB: S:\CTB PLOTTING\GRAY1.CTB

RI/FS Appendices

APPENDIX A

Photographic Record of Sampling Locations

Painesville FUSRAP Site RI/FS

Photo # 1 (Sept. 21, 2000; time: 1440; Roll 1, Sequence 11)
Boring Location: **IAP1B-SB001**; West Side of Bld. 414; Facing NW

Photo # 2 (Sept. 21, 2000; time: 1443; Roll 1, Sequence 12)
Boring Location: **IAP1B-SB002**; South Side of Bld. 414; Facing east.

Photo # 3 (Sept. 21, 2000; time: 1445; Roll 1, Sequence 13)
Boring Location: **IAP1B-SB003**; East Side of Bld. 414; Facing south.

Photo # 4 (Sept. 21, 2000; time: 1446; Roll 1, Sequence 14)
Boring Location: **IAP1B-SB004**; South Side of Bld. 415; Facing NW

Photo # 5 (Sept. 21, 2000; time: 1447; Roll 1, Sequence 15)
Boring Location: **IAP1B-SB005**; North Side of Bld. 414; Facing SE

Photo # 6 (Sept. 21, 2000; time: 1449 Roll 1, Sequence 16)
Boring Location: **IAP1B-SB006**; West Side of MDI/TDI Transfer Sta.; Facing NE

Photo # 7 (Sept. 21, 2000; time: 1458; Roll 1, Sequence 22)
Boring Location: **IAP1B-SB007**; NE Corner Bld. 415: Facing SE

Photo # 8 (Sept. 21, 2000; time: 1451; Roll 1, Sequence 17)
Boring Location: **IAP1B-SB008**; NW corner of MDI/TDI Transfer Sta.; Facing NE

Photo # 9 (Sept. 21, 2000; time: 1453; Roll 1, Sequence 18)
Boring Location: **IAP1B-SB009**; SW corner of MDI/TDI Transfer Sta.; Facing SE

Photo # 10 (Sept. 21, 2000; time: 1456; Roll 1, Sequence 20)
Boring Location: **IAP1B-SB010**; West of Bld. 415: Facing NW

Photo # 11 (Sept. 21, 2000; time: 1457; Roll 1, Sequence 21)
Boring Location: **IAP1B-SB011**; North of Bld. 415: Facing east

Photo # 12 (Sept. 21, 2000; time: 1459; Roll 1, Sequence 23)
Boring Location: **IAP1B-SB012**; East of Bld. 413: Facing SW

Photo # 13 (Sept. 21, 2000; time: 1502; Roll 2, Sequence 1)
Boring Location: **IAP1B-SB013**; South of Bld. 413: Facing west

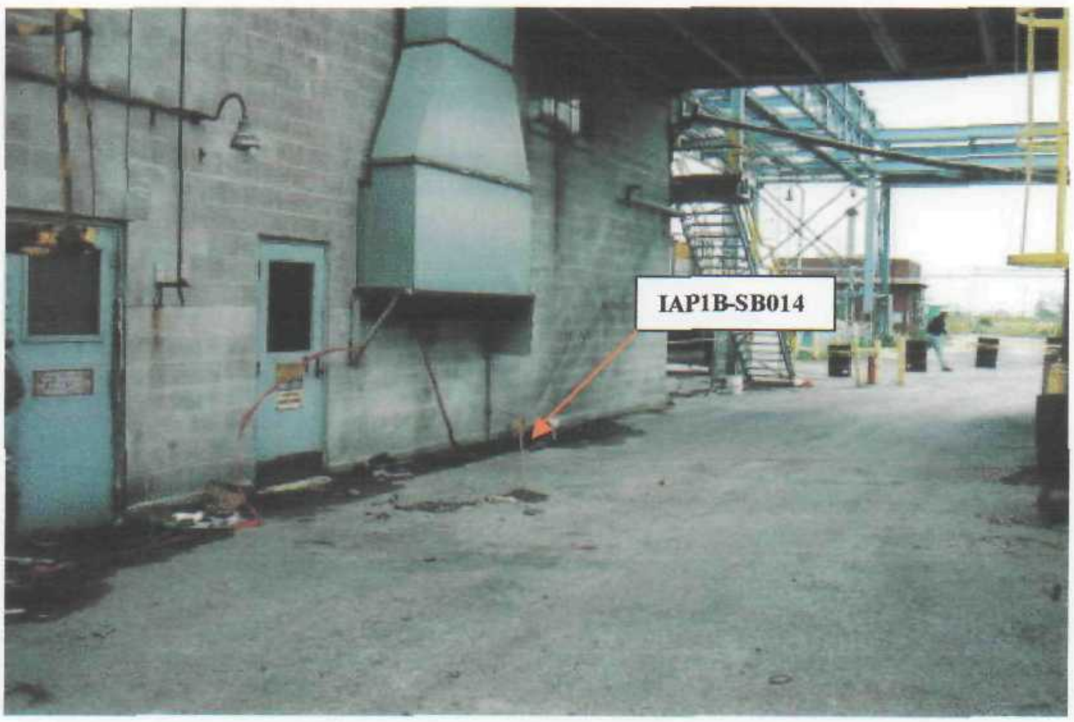


Photo # 14 (Sept. 21, 2000; time: 1500; Roll 1, Sequence 24)
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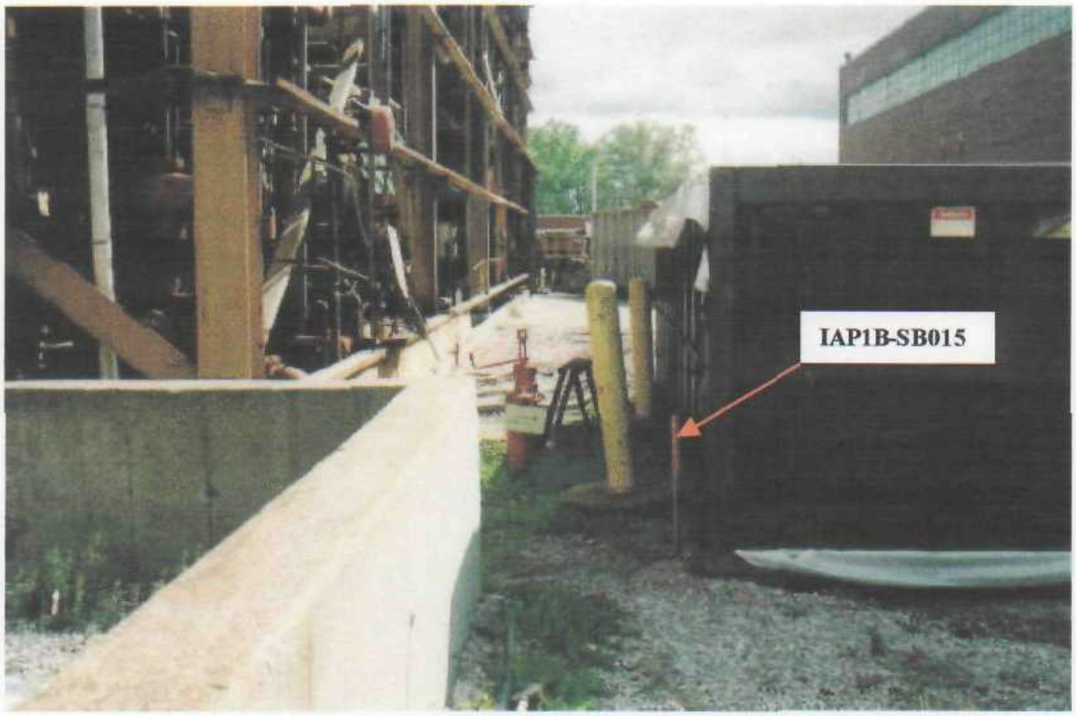

Photo # 15 (Sept. 21, 2000; time: 1501; Roll 1, Sequence 25)
Boring Location: **IAP1B-SB015**; West of Bld. 413: Facing south

Photo # 16 (Sept. 21, 2000; time: 1455; Roll 1, Sequence 19)
Boring Location: **IAP1B-SB016**; East Side of MDI/TDI Transfer Sta.; Facing north

Photo # 17 (Sept. 21, 2000; time: 1511; Roll 2, Sequence 4)
Boring Location: **IARP-SB001**; North edge of Rubble Pile: Facing SE

Photo # 18 (Sept. 21, 2000; time: 1512; Roll 2, Sequence 5)
Boring Location: **IARP-SB008**; North edge of Rubble Pile: Facing SE

Photo # 19 (Sept. 21, 2000; time: 1513; Roll 2, Sequence 6)
Boring Location: **IARP-SB011**; East edge of Rubble Pile: Facing West

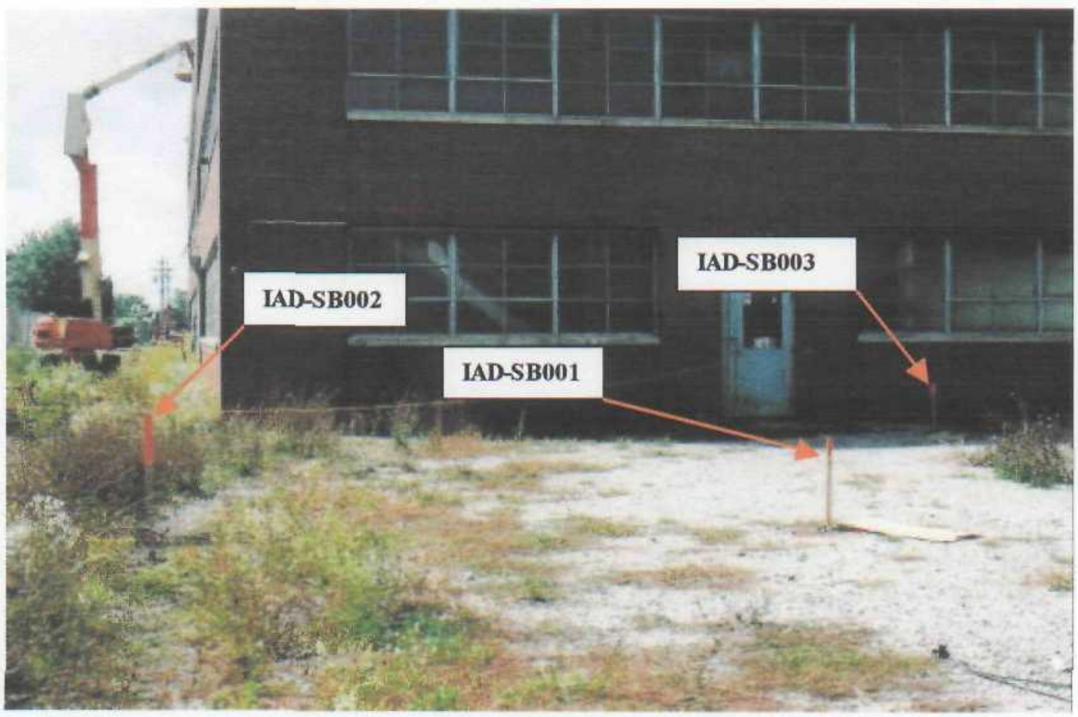

Photo # 20 (Sept. 21, 2000; time: 1507; Roll 2, Sequence 2)
Boring Locations from Left to Right: **IAD-SB002, IAD-SB001, IAD-SB003**;
East Side of Bld. 402: Facing West

Photo # 21 (Sept. 21, 2000; time: 1509; Roll 2, Sequence 3)
Boring Locations from Left to Right: **IAD-SB004, IARP-SB003**;
West Side of Rubble Pile: Facing SE

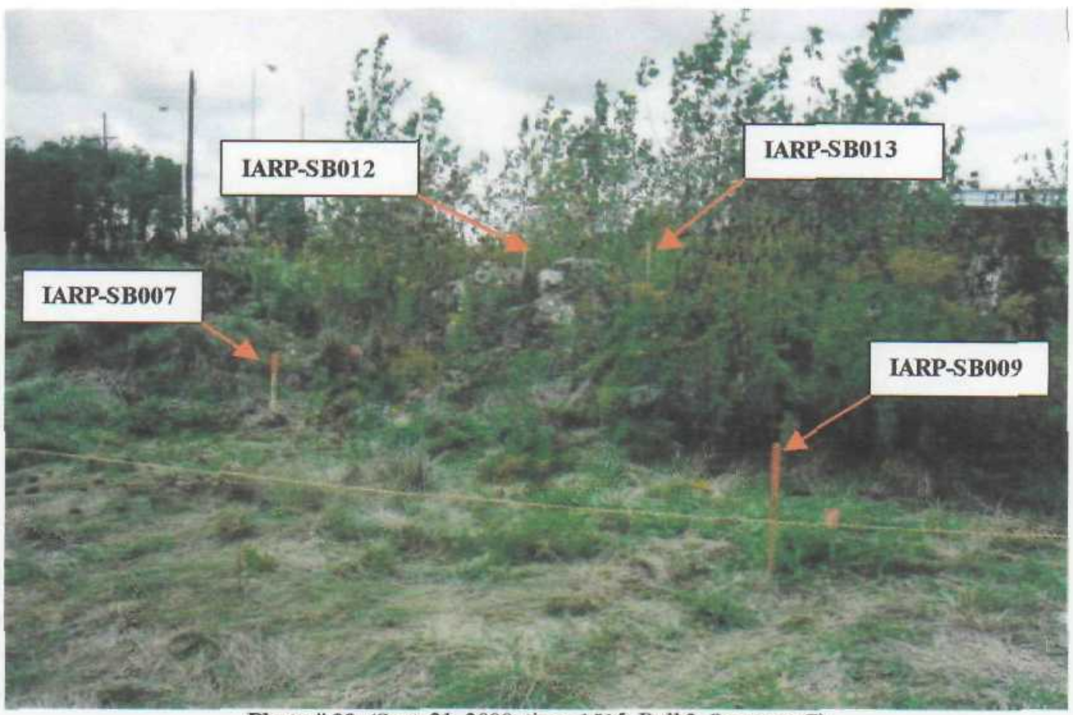

Photo # 22 (Sept. 21, 2000; time: 1515; Roll 2, Sequence 7)
Boring Locations from Left to Right: **IARP-SB007, IARP-SB012, IARP-SB013, IARP-SB009,**
East Side of Rubble Pile: Facing SW

Photo # 23 (Sept. 21, 2000; time: 1517; Roll 2, Sequence 8)
Boring Locations from Left to Right: **IARP-SB005, IARP-SB006**;
SE Corner of Rubble Pile: Facing NW

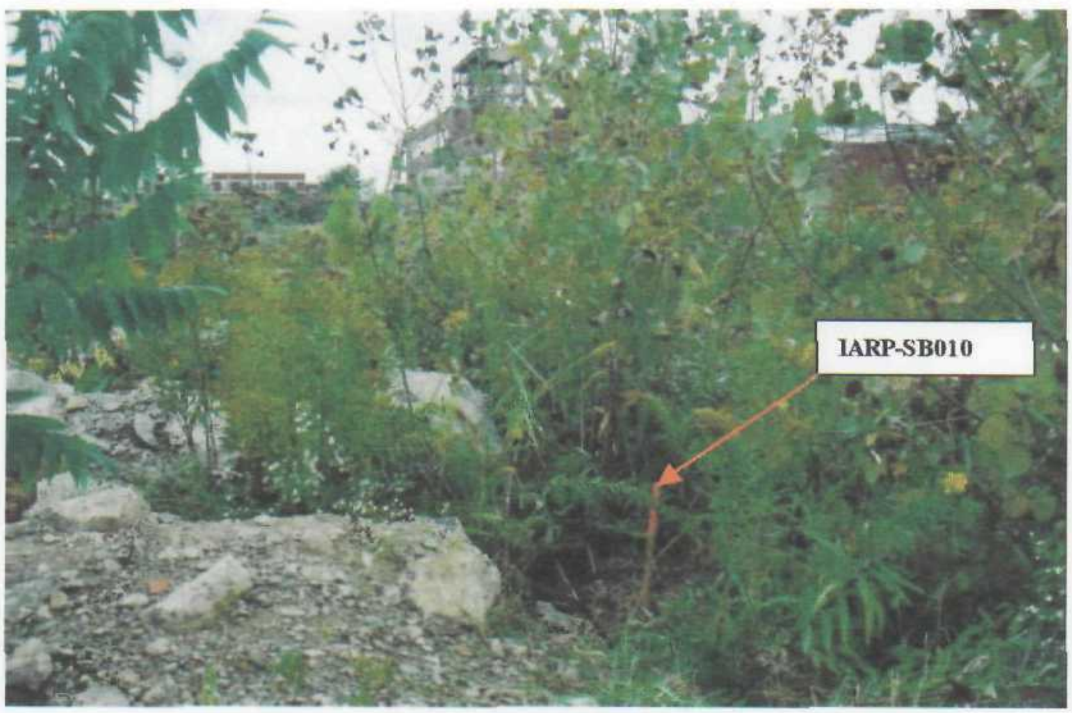

Photo # 24 (Sept. 21, 2000; time: 1518; Roll 2, Sequence 9)
Boring Location: **IARP-SB010**; South side in Rubble Pile: Facing NW

Photo # 25 (Sept. 21, 2000; time: 1520; Roll 2, Sequence 10)
Boring Location: **IARP-SB004**; South edge of Rubble Pile: Facing NW

Photo # 26 (Sept. 21, 2000; time: 1522; Roll 2, Sequence 11)
Lonza Property, from Uniroyal Prop.: Facing NE

Photo # 27 (Sept. 21, 2000; time: 1527; Roll 2, Sequence 12)
Boring Locations from Left to Right: **IAA-SB014, IAA-SB013, IAA-SB015, IAA-SB016;**
SE Side of Area A: Facing NW

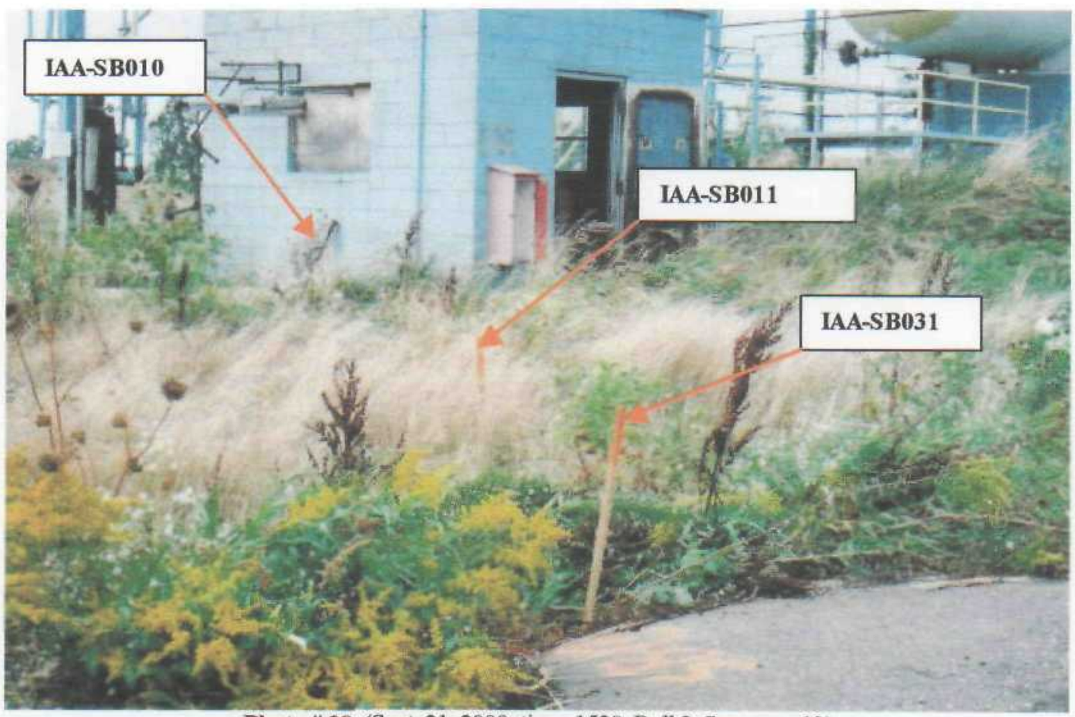

Photo # 28 (Sept. 21, 2000; time: 1530; Roll 2, Sequence 13)
Boring Locations from Left to Right: **IAA-SB010, IAA-SB011, IAA-SB031;**
SE Side of Area A: Facing NW

Photo # 29 (Sept. 21, 2000; time: 1532; Roll 2, Sequence 14)
Boring Location: **IAA-SB038**; South of BDE Tank in Area A: Facing NW

Photo # 30 (Sept. 21, 2000; time: 1533; Roll 2, Sequence 15)
Boring Locations from Left to Right: **IAA-SB028, IAA-SB007;**
West Side of Area A: Facing NE

Photo # 31 (Sept. 21, 2000; time: 1535; Roll 2, Sequence 16)
Boring Locations from Left to Right: **IAA-SB034, IAA-SB012;**
West Side of Area A: Facing SE

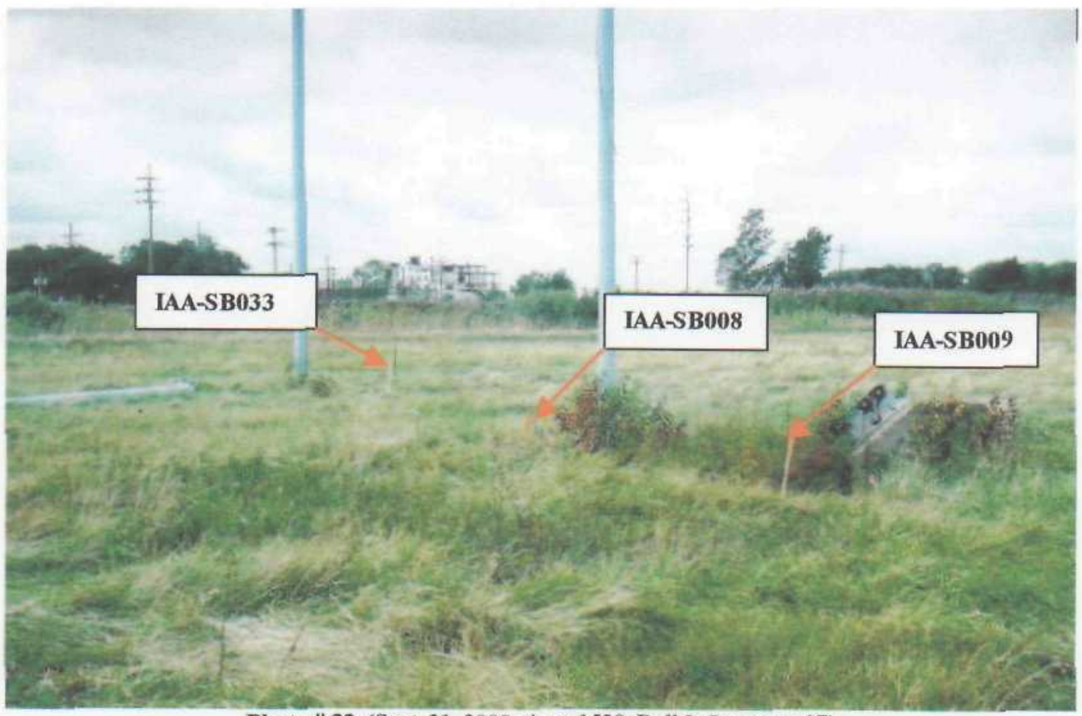

Photo # 32 (Sept. 21, 2000; time: 1538; Roll 2, Sequence 17)
Boring Locations from Left to Right: **IAA-SB033, IAA-SB008, IAA-SB009;**
West Side of Area A: Facing NW

Photo # 33 (Sept. 21, 2000; time: 1540; Roll 2, Sequence 18)
Boring Locations from Left to Right: **IAA-SB032, IAA-SB030, IAA-SB029, IAA-SB006;**
South Side of Area A: Facing east

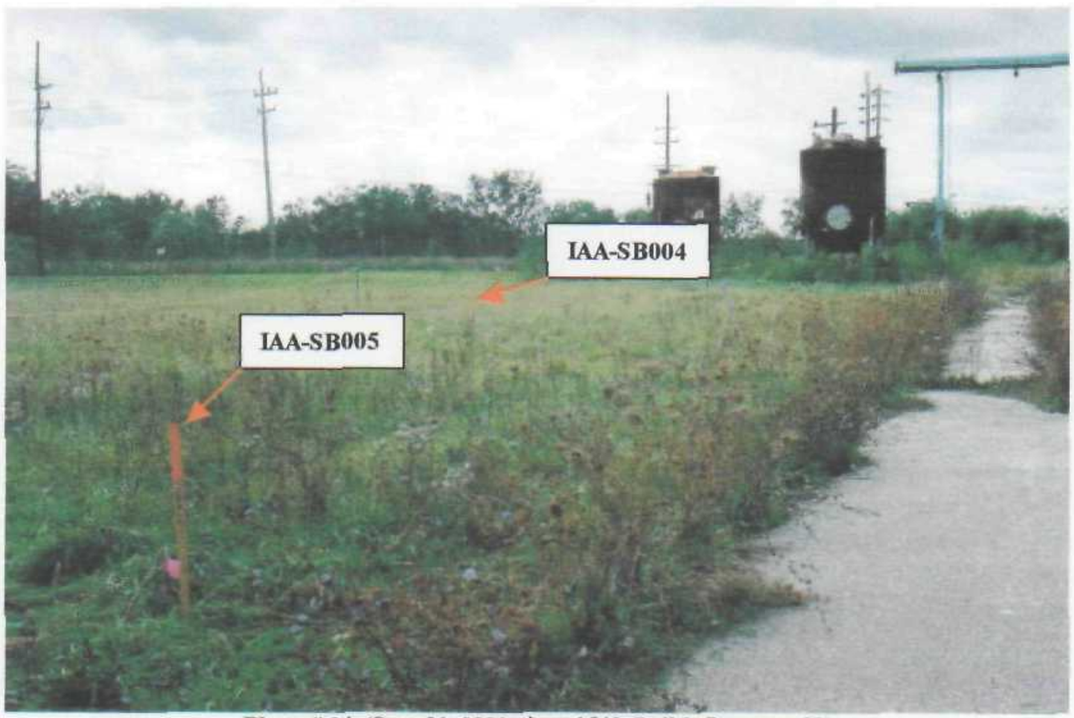

Photo # 34 (Sept. 21, 2000; time: 1543; Roll 2, Sequence 19)
Boring Locations from Left to Right: **IAA-SB005, IAA-SB004;**
South Side of Area A: Facing west

Photo # 35 (Sept. 21, 2000; time: 1600; Roll 2, Sequence 20)
Front of 90-Day Storage Area (Uniroyal Property) where the mixed waste was stored

Photo # 36 (Sept. 21, 2000; time: 1601; Roll 2, Sequence 21)
Radiological Material Storage Area located in the 90-Day Storage Area (Uniroyal Property).

Photo # 37 (Sept. 21, 2000; time: 1605; Roll 2, Sequence 22)
Boring Location: **IAG-SB001**; West of Bld. 428 in Area G: Facing SE

Photo # 38 (Sept. 21, 2000; time: 1620; Roll 2, Sequence 23)
Labels and Placards identifying Radiological Material Storage Area, located in the 90-Day Storage Area (Uniroyal Property).

Photo # 39 (Sept. 27, 2000; time: 1050; Roll 2, Sequence 24)
Radiological Material Storage Area located in the 90-Day Storage Area (Uniroyal Property).

Photo # 40 (Sept. 27, 2000; time: 1055; Roll 2, Sequence 25)
Boring Location:; West of Bld. 428 in Area G: Facing NW

Photo # 41 (Sept. 27, 2000; time: 1100; Roll 3, Sequence 1)
Boring Locations from Left to Right: **IAA-SB025, IAA-SB036;**
North Side of Area A: Facing NW

Photo # 42 (Sept. 27, 2000; time: 1104; Roll 3, Sequence 2)
Boring Locations from Left to Right: **IAA-SB024, IAA-SB023;**
Near North Side of Area A: Facing north

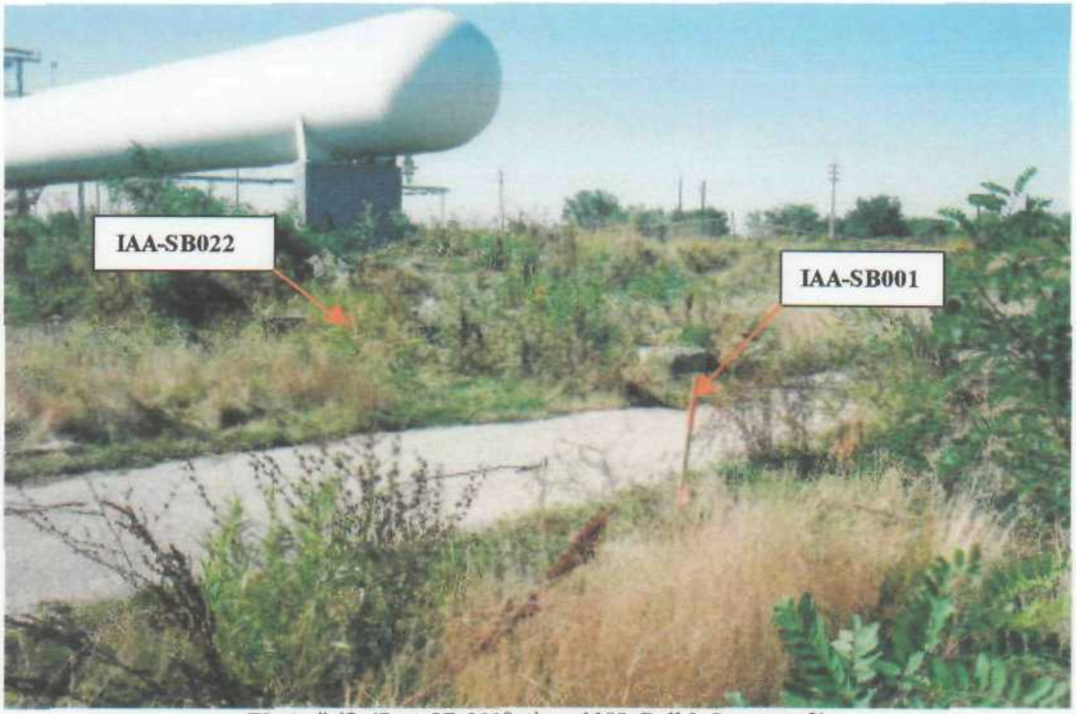

Photo # 43 (Sept. 27, 2000; time: 1108; Roll 3, Sequence 3)
Boring Locations from Left to Right: **IAA-SB022, IAA-SB001;**
North Side of Area A: Facing SW

Photo # 44 (Sept. 27, 2000; time: 1112; Roll 3, Sequence 4)
Boring Location: **IAA-SB002**; East of BDE Tank in Area A: Facing west

Photo # 45 (Sept. 27, 2000; time: 1116; Roll 3, Sequence 5)
Boring Locations from Left to Right: **IAA-SB020, IAA-SB019;**
East of BDE Tank in Area A: Facing west

Photo # 46 (Sept. 27, 2000; time: 1120; Roll 3, Sequence 6)
Boring Location: **IAA-SB003**; East of BDE Tank in Area A: Facing NW

Photo # 47 (Sept. 27, 2000; time: 1124; Roll 3, Sequence 7)
Boring Locations from Left to Right: **IAA-SB017, IAA-SB018;**
East of BDE Tank in Area A: Facing west

Photo # 48 (Sept. 27, 2000; time: 1128; Roll 3, Sequence 8)
Boring Location: **IAA-SB027**; West of BDE Tank in Area A: Facing NE

Photo # 49 (Sept. 27, 2000; time: 1200; Roll 3, Sequence 11)
Boring Location: **IAA-SB037**; Under BDE Tank on west side of south pylon in Area A: Facing south

Photo # 50 (Sept. 27, 2000; time: 1203; Roll 3, Sequence 12)
Boring Location: **IAA-SB024**; Under BDE Tank on south side of north pylon in Area A: Facing north

Photo # 51 (Sept. 27, 2000; time: 1205; Roll 3, Sequence 13)
Boring Location: **IAB-SB002**; West of former tank on containment berm north of in Area B: Facing SE

Photo # 52 (Sept. 27, 2000; time: 1210; Roll 3, Sequence 14)
Boring Location: **IAB-SB001**; South of former tank containment berm north of in Area B: Facing NE

Photo # 53 (Sept. 27, 2000; time: 1130; Roll 3, Sequence 9)
Boring Location: ***IAA-SB026****; West of BDE Tank in Area A: Facing east*

APPENDIX B

Daily Quality Control Reports/ Task Team Activity Logs

Painesville FUSRAP Site RI/FS

DATE 09/05/00

DAY

S	M	T	W	Th	F	S
		X				

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	01	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Double J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling):
See Attached Task Team Activity Log Sheet.

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS REPORT NO.: 01

JOB NO.: 01-0513-08-4191-900 DATE: 09/05/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/field work

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour
PID = >5 ppm
LEL = 10%
O_2 = 19.5%

Doug Haas Conducted Rad Worker II Training

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

SPECIAL NOTES:

TOMORROW'S PLANNED ACTIVITIES:

Begin geoprobing and sampling

PREPARED BY: Brad Richardson TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/05/00 Page 1 of ____

Task Team Members:

Doug Haas, Paul Parrish, Jeff DeVaughn, Pete Ferron
Tom Schnitzius, Joe Schultheis, ~~Bob Tucker~~
Brad Richardson

Narrative (include time and location):

Doug H, Tom S and Brad R. arrive on site @ 7:15am.
Start mobilizing equipment and instruments; Doug and
Tom preping their HP equipment and preparing for
Rad Worker Training - Steve Buechi and Dennis
Rimer (USACE Corp) on site @ 11:00 ; 11:45
drillers on site (Don Malone, Gene Stadler)
Jeff DeVaughn, Pete Ferron, Paul Parrish on site
-12:00 Lunch ; 1:00 begin Site Rad Worker
Training (Doug Haas) - done @ 4:00
Offsite : 5:50

Daily Weather Condition: A.M. 50s-60's Sunny, East Wind

P.M. 60s-70's " "

Recorded By: Brad Richardson (Signature) QC Checked by: ____ (Signature)

DATE 09/06/00

DAY	S	M	T	W	Th	F	S
				X			

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	70-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	02	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Double J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling):
See Attached Task Team Activity Log Sheet.

1 Sample from IAP 1B-SB001 (West side of Building 414)
1 " " " SB002 (South " " " 414)
1 " " " SB003 (East " " " 414)
1 " " " SB004 (South " " " 415)
Note: in all four borings Gamma Activity was below or at Background levels.

All samples collected were for radiological only

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS REPORT NO.: 02

JOB NO.: 01-0513-08-4191-900 DATE: 09/06/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

- Levels: Gamma Activity w/ 2×2 = 5 mrem/hour
  - PID = >5 ppm
  - LEL = 10%
  - O_2 = 19.5%
- Health and Safety "Tailgate meeting"
- Health and Safety Site Specific Briefing

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

- The sample location spotted in the SAP along north wall of Building 414 was not sampled: from pre-1950 Building (from older pre-existing building)
- Dennis Rimer and I discussed the possible sampling locations in Rubble Pile that will have to be moved

SPECIAL NOTES:

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling in "Post 1950 Buildings"

PREPARED BY: Brad Richardson TITLE: Project/Field Manager

I have read and understand the Site Safety and Health Plan and have received the intitial site briefing.

TRAINING RECORD

COURSE TITLE: Painesville FUSRAP RI

~~PROCEDURE NO.:~~ ______ ~~LENGTH OF COURSE:~~ ______

~~INSTRUCTOR:~~ ______ ~~DATE OF TRAINING:~~ ______

EMPLOYEE NUMBER	NAME (PRINT)	SIGNATURE	ORGANIZATION / DIVISION	Date
	J. DeVaughn	J DeVaughn	SAIC	9-6-00
	Dave Haas	Dave Haas	SAIC	
	Tom Schnitzius	Thomas Schnitzius	SAIC/Pangea	
	Paul Parrish	Paul Parrish	SAIC	
	JAMES E. GRAZIOSI	James E Graziosi	UNIROYAL	
	JOSEPH A. SPENCER	Joseph A. Spencer	~~UNIROYAL CHEMICAL~~	
	AB Richardson	A Bert Richardson	SAIC	
	Robert Tucker	Robert Tucker	SAIC	
	E. Joseph Schultheis	E. Joseph Schultheis	SAIC	

PROGRAM DESIGNATOR: J DeVaughn PROJECT DESIGNATOR: ______

PAGE ____ OF ____

MOBILE EQUIPMENT AND CONSTRUCTION VEHICLES
SAFETY INSPECTION CHECKLIST

Project Painesville Focused Remedial Investigation

Prime Contractor SAIC Contract No. ______

Furnished by Double J Drilling of WV Date 9/6/00

Make Diedrich Model No. D-50 Serial No. ______

Type of Equipment Drill Rig

Requirement - EM385-1-1 references are shown in parentheses	Yes	No	N A
1. Is a Roll Over Protective Structure provided? (16.B.12)	X		
2. Is certification from the manufacturer or a licensed engineer attached to this checklist? (16.B.12d) OR			X
Is the manufacture's name, ROPS model number, and the make and model or series equipment the structure is designed to fit permanently affixed to the roll over structure? (16.B.12f)			X
3. Is a Falling Object Protective Structure provided? (16.B.11)			X
4. Is all glass in the operator's compartment safety glass? (16.B.10)		X	
5. Are reverse signal alarms provided? (16.B.01)	X		
a. Is the alarm loud enough to be heard under the prevailing conditions? (16.B.01b)	X		
b. Does the alarm operate automatically upon commencement of the backward motion? (16.B.01c)	X		
6. Are seat belts provided? (16.B.08, 16.B.12a)	X		
7. Are the brakes capable of stopping and holding the equipment on the grade of operation while fully loaded? (16.A.07d)	X		
8. Is the equipment equipped with at least one dry chemical fire extinguisher rated at least 5-B:C? (16.A.26)	X		

Requirement - EM385-1-1 references are shown in parentheses	Yes	No	N A
9. Are rotating, reciprocating, or other moving parts adequately guarded? (16.B.03a)	X		
10. Are all hot surfaces guarded or insulated to prevent injury and fire? (16.B.03b)	X		
11. Is safe access provided for operators and maintenance personnel? (16.B.03d,e)	X		
12. Is vehicle properly equipped with a speedometer, fuel gauge, horn, windshield wiper, defroster, rear view mirror, and nonslip surfaces on steps? (18.A.06)	X		
13. Is glass in vehicle safety glass free of cracks? (18.A.07)	X		
14. Does dump truck bed have a holding device to prevent accidental lowering of the bed while maintenance or inspection is being done? (18.A.10a)			X
15. Is the manufacturer's operating and maintenance manual available on site? (16.A.01a, 16.A.04c, 16.A.05, 16.A.08a)	X		
16. Is there a procedure in place for the periodic inspection of equipment/vehicle with the records of all inspections and tests to be available at the site? (16.A.01, 16.A.02, 16.A.03c, 18.A.02, 18.A.03)	X		

CORRECTION OF DEFICIENCIES* (with date corrected)

____

____

*NOTE: Equipment/vehicle shall not be utilized until all deficiencies have been corrected.

Superintendent

Contractor Quality Control

Subcontractor Foreman

Equipment/Vehicle Operator

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville Fusrap **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/06/00 Page 1 of 4

Task Team Members:

Brad Richardson (SAIC)	Don Malone (J T Drilling)
Joe Schultheis "	Gene Stradley (J.J. Drilling)
Paul Parrish "	Bob Tucker (SAIC)
Jeff DeVaughn "	
Doug Haas "	
Tom Schnitzius "	

Narrative (include time and location):

7:00 On Site - Calibrating PID and LEL; Doug Haas collecting "incoming" rig smears before rig decon. 7:30 - Dennis Rimer and Sook Reid (USACE) on site; Calibrate done: 8:00 - Begin Site Specific H&S Briefing (given by Jeff DeVaughn) 9:45 - Begin Kickoff Meeting (given by Brad Richardson) (in attendance was all SAIC and USACE personnel on site) 11:00 Uniroyal Subcontractor Meeting w/ Joe Spencer and Jim Graziosi, Scott (Asbestos Abatement) and Joe Swab (Demolition) and Brad Richardson (SAIC) - Decided To start ~~at~~ away geoprobe at Building 414, then 415, the 413 to get out of demolition's way. 11:15 - Fed Ex brings

Daily Weather Condition: A.M. 50s - Clear, Sunny

P.M. ______

Recorded By: Brad Richardson (Signature) QC Checked by: ______ (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: **PROJECT NO:**

Date: (mm/dd/yy): ~~09/07/00~~ 09/06/00

Task Team Members:

see Page 1

Narrative (include time and location):

DI Water and Rad Friskers. Begin decon of all equipment. 12:00 - Find out that USACE Lab in Omaha does not accept Rad samples. The new corp split lab is: Nuclear Technological Services, Inc. (NTS)

635 Hembree Pkwy

Roswell, GA 30076

POC: Dr Hermon Rao

T: (770) 663-0711

F: (770) 663-0547

1503: Start Drilling on West edge of Building 414 and Collect one (1) sample for Rad only from

Daily Weather Condition: A.M.

P.M. Sunny, 70's. South Breeze.

Recorded By: (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP

PROJECT NO: 01-0513-08-4191-900

Date: (mm/dd/yy): 09/06/00

Page 3 of 4

Task Team Members:

see Page 1

Narrative (include time and location):

surface interval (all Gamma Activity was at back-ground levels throughout length of column; decided The surface 0'-1' sample (obvious fill material) was best candidate to collect for rad. analysis) 1600: walked Rubble Pile area - we may have to rethink sample strategy in this area since mostly inaccessible w/ a rig and hand augering. 1600: start drilling hole ~~on~~ AB along south ~~east~~ wall of Bld. 414 ~~(next to tank farm,)~~ DM 1650: start drilling along east wall of Bld 414 (next to tank farm) 1740: start drilling south wall of Bld 415 (SB004) Note: Field Determined

Daily Weather Condition: A.M.

P.M. Sunny 70's Breeze SE

Recorded By: [signature] (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP **PROJECT NO:** 01-0513-00-4191-900

Date: (mm/dd/yy): 09/06/00 Page 4 of 4

Task Team Members:

See Page 1

Narrative (include time and location):

to remove sample location spotted along north wall of Bld 414, because wall is obviously a pre-1950 wall from older-pre-existing building. 1800 - Cleaning up - decon
1900 - off site

Daily Weather Condition: A.M. Sunny 70s Breeze

P.M.

Recorded By (Signature) QC Checked by: (Signature)

DATE 09/07/00

DAY	S	M	T	W	Th	F	S
					X		

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	03	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Dable J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling):
See Attached Task Team Activity Log Sheet.

1 Sample from IAP1B-SB005 (North side of Building 414)
1 Split, 1 Dup. @ " " " " " "
1 Sample from IAP1B-SB006 (West side of Building MDI/TDI Transf)
1 " " " SB007 (NE corner of Buildig 415)
1 " " " SB008 (NW corner of MDI/TDI Transf)
1 " " " SB009 (SW corne " " ")
1 " " " SB010 (West side of Building 415)
1 " " " SB011 (North side of " 415)

Sent Samples to Recra Lab, Thermoretek, GEL, NTS

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS REPORT NO.: 03

JOB NO.: 01-0513-08-4191-900 DATE: 09/07/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour
PID = >5 ppm
LEL = 10%
O_2 = 19.5%
Health and Safety "Tailgate meeting"

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

SPECIAL NOTES:

Submitted FCR 002 & 003

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling in Buildings and Rubble Pile.

PREPARED BY: Brad Richardson TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP **PROJECT NO:** 01-0513-08-4191-400

Date: (mm/dd/yy): 09/07/00 Page 1 of 3

Task Team Members:
Brad Richardson (SAIC)
Joe Schultheis "
Paul Parrish "
Jeff DeVaughn "
Bob Tucker "
Tom Schnitzius "
Doug Haas "

Narrative (include time and location):

0700: Arrive on site; Double J Drilling (Don Malone, Gene Stradley) on site: Calibrate Equipment., Drillers load equipment. Calibration Logged, 0745 - Dennis Rimer on site, conducted H&S briefing (bees, traffic, rad protection) documented in Field Manager Log book. 0830 Start drilling at North Wall of Bld 414 - Found out from Joe Spencer that that wall is Post 1950 construction. Bob Tucker and I locate the rest of the Post 1950 Building Locations around Bld 413, 415 and MDI/TDI Transfer Area. The area on east side of MDI/TDI Transfer Building is inaccessible to the rig (will have to hand-

Daily Weather Condition: A.M. 50's clear breeze

P.M.

Recorded By: [signature] (Signature) QC Checked by: (Signature)

99-011M(P65)/040899 FTP-1215, Revision 0. 4/07/99

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: **PROJECT NO:**

Date: (mm/dd/yy): 09/07/00 Page 2 of 3

Task Team Members:

See Page 1

Narrative (include time and location):

auger this location. It should be noted that all these locations around the buildings were placed haphazardly (not numerically random) based on accessibility for the rig. A lot of ground debris/obstruction and overhead obstruction greatly narrow choices of accessibility. This does not constitute a Field Change since the SAP states "Unless professional judgement dictates otherwise, the actual locations....".
1300: Break for Lunch 13:45 Back from Lunch; Chris Hallam on site. 14:15 Begin drilling @ North Wall of ~~Blt.~~ DBR MDI/TDI Transfer Bld.

Daily Weather Condition: A.M. 50s clear breeze

P.M. 70's clear breez~

Recorded By: A Brad Richardson QC Checked by: ____________
(Signature) (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: **PROJECT NO:**

Date: (mm/dd/yy): 09/07/00 Page 3 of 3

Task Team Members:

See Page 1

Narrative (include time and location):

(SB008); 1420 - Spoke w Dennis Rimer about changing sampling selection procedure on the Rubble Pile to reflect the same as the other areas being sampled. He agrees. (See FCO-003) Later - drilling at SB009 (South Wall of MPI/TDI Transfer Station) I collect decon equipment (including geoprobe shoes). Drilling at SB010 at West Wall of Blg 415. Set up Fed Ex Pick up for sample containers (sent to labs) Drilling at SB011 at North Wall of Blg 415. 1800 Finishing at SB011, Decon equipment, clean area, leave site

Daily Weather Condition: A.M.

P.M. 70s, clear, breeze SW

Recorded By: A Brad Rachandr
(Signature)

QC Checked by:
(Signature)

DATE 09/08/00

DAY	S	M	T	W	Th	F	S
						X	

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	04	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Double J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling): See Task Team Activity Sheets
1 sample from 1AP1B - SB012 (East side of Bld 413)
1 sample " " SB013 (South " " ")
1 " " " SB014 (North " " 413)
1 " " " SB015 (West " " 413)
1 " " 1ARP- SB001 (North edge of Rubble Pile)

DM

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS REPORT NO.: 04

JOB NO.: 01-0513-08-4191-900 DATE: 09/08/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour

PID = >5 ppm

LEL = 10%

O_2 = 19.5%

Health and Safety "Tailgate meeting"

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

~~See Attached Task Team Activity Log Sheet.~~ BAR

SPECIAL NOTES: Nancy Zikmanis was on-site this morning; discussed sample location strategy around the rubble pile.

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling

PREPARED BY: Brad Richardson TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/08/00 Page 1 of 4

Task Team Members:
Brad Richardson
Joe Schultheis
Paul Parrish
Jeff DeVaughn
Doug Haas
Tom Schnitzius

Narrative (include time and location):

0700 - All at site. 0720 - Equipment Calibrated and recorded in M&TE Log. - Drillers on site (Don Malone and Gene Stradley) - Dennis Rimer (USACE) on site. Health and Safety Briefing - covered HP's screening equipment before leaving site and prior to decon, slips trips and falls, caution around Asbestos Abatement Barriers (Bld 413). The H&S breifing documented in Field Manager Log book (page 7). During Tailgate discussed todays schedule: Must be off Uniroyal property no later than 1530 today at their request. ∴ Finish drilling by 1430 today. Asked everyone

Daily Weather Condition: A.M. Clear, 60-70s, Breeze NW

P.M.

Recorded By: A Brad Richardson (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/08/00 Page 2 of 4

Task Team Members:

See Page 1

Narrative (include time and location):

to be on site next Monday at 0700.
0800 - Setting Rig up on East side of Bld 413
(SB012) - Rig lost ~~split~~ shoe down hole -
0900 - At SB012 got PID reading of ≈130ppm, ∴
will collect Full Suite. 0910 - Setting up Rig on
South side of Bld 413 (SB013) - 0930 Nancy
Zikmanis on site - She and I walked area around
rubble pile and painted areas where we both agreed
could be sampled and be indicative of the
set forth intention ~~of~~; 10:00 - Dennis, Nancy and
I conferenced called Steve Buechi to discuss ~~ed~~

Daily Weather Condition: A.M. Clear, 60-70's, Breeze NW

P.M.

Recorded By: [signature] (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/08/00 Page 3 of 4

Task Team Members:

See Page 1

Narrative (include time and location):

biasly sampling the screened and flagged (by Chris Hallam in June) areas around (w/in 10' of Pile) of Rubble Pile and including them w/in the "10" sample set. He indicated that was OK (w/reservation since he will be here next week to see these points himself). Dennis, Nancy and I took a walk around Rubble Pile again to ~~scan or~~ OBA have another pair of eyes.

10:30 Drillers @ North side of Bld 413 (SB014)

1130 Drillers @ West side of Bld 413 (SB015)

1230 Lunch 1300 Finish Lunch - drillers have to

Daily Weather Condition: A.M. Clear, 70's Breeze NW

P.M.

Recorded By: [signature] QC Checked by:
(Signature) (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/08/00 Page 4 of 4

Task Team Members:

see Page 1

Narrative (include time and location):

decon length of down hole tools (for one more hole)
1345 - Drilling in Rubble Pile along north edge.
@ (1ARP-SB001) - 1415 - Finish drilling. HP
doing smear sampling and frisk of personnel and
equipment - Label all drums of IDW and
Decon Water; Rad-bag waste; store IDW
soil (from 1AP1B) on pallet in Uniroyal 90-day store.
Drillers decon stays on asphalt pad and rest
stored in Bld 411. Decon equipment and rig.
clean site, wait for Fed Ex to pick-up
shippment - Off-site ~~3~~ 1530. (1430)

Daily Weather Condition: A.M. ______

P.M. Clear - 70's Breeze NW

Recorded By: [signature] (Signature) QC Checked by: ______ (Signature)

DATE 09/11/00

DAY	S	M	T	W	Th	F	S
		X					

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	05	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Doable J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling):
0700 - On site w/ HP support and Pete Ferron who is replacing Jeff DeVaughn as SHO

See attached Task Team Activity Log Sheet.

- 1 Sample location from Rubble Pile @ SB002
- 1 " " " " " SB003
- 1 " " " " " SB004
- 1 " " " " " SB005
- 1 " " " " " SB006
- 1 " " " " " SB007
- 1 " " " " " SB008

Send Samples to Recra and Thermo Retec

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS

REPORT NO.: 05

JOB NO.: 01-0513-08-4191-900

DATE: 09/11/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour
PID = >5 ppm
LEL = 10%
O_2 = 19.5%

Health and Safety "Tailgate meeting".
Health and Safety (Site Specific) Briefing conducted for Steve Bechi and Bob Vanderhese (UNIROYAL).

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

- Overhead power lines on east side of Rubble Pile; Jim Graziosi informed me (and Scott (w/ asbestos company)) that lines are dead - The box fuses have been removed and the lines detached from box.

SPECIAL NOTES:

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling

PREPARED BY: Brad Richardson

TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/11/00 Page 1 of 4

Task Team Members:
Brad Richardson
Pete Ferron
Joe Schultheis
Paul Parrish
Doug Haas
Tom Schmitzius

Narrative (include time and location):

0700 - At site; Pete Ferron here to replace Jeff DeVaughn as SHO. Doug & Tom (HPs) on site. 0710 Calibrate PID and LEL (Recorded on M&TE Sheets). 0735 - Drillers on site (Don Malone, Gene Stradley), need to load up rig w/ equipment and fill water tank. Rain Gear? 0830 - Setting up at Rubble Pile - drilling SB002; Checked w/ Jim Graziosi on power line running overhead across east side of Rubble Pile. - Jim assured me that the fuses were removed from the box and the lines had been removed. ∴ The lines are dead. 10:05 Steve

Daily Weather Condition: A.M. Partly cloudy, 60s-70s, Breeze

P.M.

Recorded By: Brad Richardson (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: **PROJECT NO:**

Date: (mm/dd/yy): 09/11/00 Page 2 of 4

Task Team Members:

Seepage 1

Narrative (include time and location):

Buechi on site.: Pete conducting Site Specific Health and Safety Briefing (along w/ Dougs Rad training) to Steve Buechi and Bob Van ____ (Uniroyal Retiree). Steve and I walked out to Rubble Pile. (currently drilling IARP-SB003). 10:30 recieved map. of Area A from Gamma Walkover Survey (Bias locate around Butadiene Tank, RR Tracks, Spill Basin, and Foundations). Note: At IARP-SB001 & SB002 - fill dirt down to 2' but at " SB003 - fill dirt down to ≥7' hit refusal - will try another hole @ SB003 - Spoke w/ Tom Wilson about setting up a time to drill on Lonza

Daily Weather Condition: A.M. Partly Cloudy, 60-70s Breeze

P.M. ________

Recorded By: ________ (Signature) QC Checked by: ________ (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/11/00 Page 3 of 4

Task Team Members:

see page 1

Narrative (include time and location):

property (adjacent to Area C). He will check w/scheduler about moving Rail cars and getting back w/me on a time. I asked him to allow us to drill through the concrete on the rail siding. He said we can do that. At Rubble Pile - collected samples at location SB004 and SB005. Lunch Break @ 12:30 - 13:30 Back - Drillers have to decon rods - Decon shoes in Blg 411, ; 14:00 leaving for Rubble Pile to SB006; 1420 with Doug Haas in Area A locating Bias Samples. ; Tom Wilson (Lonza) called back - Wants us there

Daily Weather Condition: A.M. ____

P.M. Partly Cloudy, 70's Breeze Humid

Recorded By: [signature] (Signature) ~~QC~~ Checked by: ____ (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: **PROJECT NO:**

Date: (mm/dd/yy): 09/11/00 Page 4 of 4

Task Team Members:

See Page 1

Narrative (include time and location):

Wednesday Morning for safety orientation and drilling immediately afterwards. 1500 - Drilling at Rubble Pile SB007; Drilling at Rubble Pile SB008. Sending samples to Recra Lab and Thermo Retec. Due to Lightning to west, shutdown drilling @ 1630 - Decon and Cleanup.

Daily Weather Condition: A.M.

P.M. Cloudy, 80's Humid

Recorded By: [signature] (Signature) QC Checked by: (Signature)

Radionuclides

SAIC Science Applications International Corporation An Employee-Owned Company

Chain of Custody Record

Date 9/8/00 Page 1 of 1

Shipment No. TRT-003

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY DUBLIN OH 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED REMEDIAL INVEST.
Job/P.O. No.
Sampler (Signature) Paul Parrish (Printed Name) Paul M Parrish

Laboratory Name THERMO RETEC
Address 601 SCARBORO RD OAK RIDGE TN. 37830
Phone (865) 481-0683 Ex. 128
Contact Name Mike McDougall

Requested Parameters: U^{238} Alpha Spec.; Th^{230} Alpha Spec.; Ra^{226} Gamma Spec.

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	U^{238} Alpha Spec.	Th^{230} Alpha Spec.	Ra^{226} Gamma Spec.	No. of Containers	Observations, Comments, Special Instructions
	SOIL	PVSB0163	9/8/00	1348	IARP	X	X	X	1	0.5-1.5 SB001
	↓	PVSB0166	9/11/00	950	IARP	X	X	X	1	1.5-2.5 SB002 *
		PVSB0172		1145		X	X	X	1	2.0-2.9 SB004
		PVSB0175		1215		X	X	X	1	0.5-1.5 SB005 *
		PVSB0169		1115		X	X	X	1	1.25-2.25 SB003
	↓	PVSB0178	↓	1429	↓	X	X	X	1	1.5-2.6' SB006 * MS/MSD ~~MS/MSD~~ ejs

Relinquished by	Date	Received by	Date
Signature: E.J. Schultheis	9/11/00	Signature: Federal Express	9/11/00
Printed Name: E. J. Schultheis	Time 1700	Printed Name:	Time 1700
Company: SAIC		Company:	

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Total Number of Containers: 6

Shipment Method: Fed Ex 8216 3288 3170

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500

Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031

Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100

Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550

Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600

Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

DATE 09/12/00

DAY

S	M	T	W	Th	F	S
		X				

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	06	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Double J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling):
On Site @ 7:00 - Calibrating PID and LEL - Recorded calibration on M&TE Sheet. - 7:30 - Health and Safety Tailgate Briefing - Recorded in Manager Log book.

1 sample from 1ARP - SB009
1 " " " SB010
1 " " 1AR1B - SB0016
1 " " 1AA - SB001
1 " " " SB002
1 " " " SB003

Sent Samples to Recra, Thermo Retec, GEL

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS

REPORT NO.: 06

JOB NO.: 01-0513-08-4191-900

DATE: 09/12/00

QUALITTY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour
PID = >5 ppm
LEL = 10%
O_2 = 19.5%

Health and Safety "Tailgate meeting"

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

Rig's Anvil shaft broke - Drillers found a shop to weld it together - Down from 10:00 - 13:30

SPECIAL NOTES:

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling

PREPARED BY: Brad Richardson

TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/12/00 Page 1 of 3

Task Team Members:

Brad Richardson
Joe Schultheis
Paul Parrish
Pete Ferron
Doug Haas
Tom Schnitzius

Narrative (include time and location):

0700 - On Site 0705 - Equipment Calibration Recorded on M&TE sheet. 0710 - Drillers on site (Don Malone and Gene Stradley). 0800 Health and Safety Tailgate Briefing, Recorded in Field Management Logbook. Paul & Pete w/ drillers @ SB009 (At Rubble Pile). SB009 is located on east side of Rubble Pile at Chris Hallam's pin flag location (marked 30K). - Drill at MDI/TDI Transfer Station (SB016). Drill Rig "Anvil" broke @ 10:00, Drillers have to go off site to have the broken piece welded.

Daily Weather Condition: A.M. Rain/Overcast 70's Breeze

P.M.

Recorded By: B Richardson (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/12/00 Page 2 of 3

Task Team Members:

See Page 1

Narrative (include time and location):

Doug Haas and I took the GPS unit to Area "A" - locate some bias sampling location. Attempt to hand auger at the Rubble Pile. Nancy Zikmanis (OEPA) on site 12:00 Break for Lunch 1330 Back from Lunch - Have driller's move over to Area A - start on Marssim samples; 3 are reachable w/ the rig and 1 is on top of BDE Tank berm which is inaccessible. Will move this marssim location to the Marssim location SE of Pump House. 1415 - Drilling Area A SB001 (North Marssims Point) - 1515 Drilling 1AA SB002 (East

Daily Weather Condition: A.M. Overcast (Rain) - 70's, Windy

P.M.

Recorded By: [signature] QC Checked by:
(Signature) (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/12/00 Page 3 of 3

Task Team Members:

See Page 1

Narrative (include time and location):

Marssims Point). 1415 both Nancy Zikmanis and Steve Buechi left site. -1615- Drilling IAA-SB003 (South Marssims Point) - hit geotextile fabric @ 1.5' BGS - Beneath fabric the soil had background gamma. - collected that interval for analysis. GPS'ed Rubble Pile SB's. -1650- Decon and send samples to GEL, Thermo Retec, and Recra.

Daily Weather Condition: A.M.

P.M. Off On Rain 70's Breeze

Recorded By: [signature] (Signature) QC Checked by: (Signature)

SAIC Science Applications International Corporation — An Employee-Owned Company

Chain of Custody Record

Date 9/12/00 Page 1 of 1

Shipment No. GEL-003

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY DUBLIN, OH 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED REMEDIAL INVEST.
Job/P.O. No.

Sampler (Signature) Paul M Parrish (Printed Name) Paul M Parrish

Laboratory Name GENERAL ENGINEERING
Address 2040 SAVAGE RD. CHARLESTON, SC 29417
Phone (843) 556-8171
Contact Name JAMES STELLING

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	GRAIN SIZE ASTM 422	ATTERBERG ASTM 4318	MOISTURE ASTM 2216	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	SOIL	PVSB0164	9/8/00	1355	RP/SB0001	X	X	X	1	8.0-10.3'
	SOIL	PVSB0179	9/11/00	1430	RP/SB0006	X	X	X	1	8.0-10.2'
	SOIL	PVSB0185	9/11/00	1606	RP/SB0008	X	X	X	1	8.0-9.5'

Relinquished by	Date	Received by	Date
Signature: E.J. Schultheis; Printed Name: E.J. Schultheis; Company: SAIC	9/12/00; Time 1700	Signature: Federal Express; Printed Name:; Company:	9/12/00; Time 1700
Signature:; Printed Name:; Company:	Date; Time	Signature:; Printed Name:; Company:	Date; Time

Total Number of Containers:

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: Fed Ex 8216 3288 3158

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500

Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031

Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100

Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550

Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600

Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

Radionuclides

SAIC Science Applications International Corporation
An Employee-Owned Company

Chain of Custody Record

Date 9/11/00 Page 1 of 1

Shipment No. TRT-004

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY DUBLIN, OH. 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED REMEDIAL INVEST.
Job/P.O. No.
Sampler (Signature) [signature] (Printed Name) Paul M Parrish

Laboratory Name THERMO RETEC
Address 601 SCARBORO RD. OAK RIDGE TN. 37830
Phone (865) 481-0683 EXT. 128
Contact Name MIKE McDOUGALL

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	U^{238} Alpha Spec.	Th^{230} Alpha Spec.	Ra^{226} Gamma Spec.	No. of Containers	Observations, Comments, Special Instructions
	SOIL	PVSB0181	9/11/00	1520	IARP	X	X	X	1	1.0-2.0'
	↓	PVSB0184	↓	1608	↓	X	X	X	1	1.3-2.3'
		PVSB0187	9/12/00	0850	↓	X	X	X	1	0.0-1.5'
		PVSB0160	↓	0943	IAP1B	X	X	X	1	4.0-5.0' *
		PVSB0190		1201	IARP	X	X	X	1	0.0-0.5'
		PVSB0001		1450	IAA	X	X	X	1	0.5-1.5'
	↓	PVSB0004	↓	1510	IAA	X	X	X	1	0.3-1.3' *

Relinquished by
Signature E.J. Schultheis
Printed Name E.J. SCHULTHEIS
Company SAIC
Date 9/12/00
Time 1700

Received by
Signature Federal Express
Printed Name
Company
Date 9/12/00
Time 1700

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 7

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: Fed Ex 8216 3288 3136

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500
Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031
Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100
Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550
Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600
Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

SAIC Science Applications International Corporation
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Chain-of-Cust 'y Record

Date 9/12/00 Page 1 of 1

Shipment No RECRA 04

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY DUBLIN, OH. 43017
Phone Number (614) 793-7600
Project Name PAINESVILLE FOCUSED REMEDIAL INVEST.
Job/P.O. No.

Sampler (Signature) E.J. Schultheis (Printed Name) E.J. Schultheis

Laboratory Name RECRA ENVIRONMENTAL
Address 208 WELSH POOL RD LIONVILLE PA. 19341
Phone (610) 280-3000 Ext. 4286
Contact Name JUDY STONE

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	VOC 8260B	SVOC 8270C	Pesticides 8081A	PCB 8082	TAL Metals	Temperature	No. of Containers	Observations, Comments, Special Instructions
	SOIL	PVSB0160	9/12/00	0943	PIB7/SB0016	X	X	X	X	X		5	3 Encore samplers/bag
	SOIL	PVSB0004	9/12/00	1510	A/SB0002	X	X	X	X	X		5	3 Encore samplers/bag PID-100 ppm
	WATER	TB0005	9/12/00	0943	NA	X						1	
	WATER	COOLANT	9/12/00	NA	NA						X	1	Field Temp - 4°C

Total Numbers of Containers: 12

Shipment Method: Fed Ex 8216 3288 3125

Relinquished By	Date	Received By	Date
Signature: E.J. Schultheis Printed Name: E.J. Schultheis Company: SAIC	9/12/00 Time 1700	Signature: Federal Express Printed Name: Company:	9/12/00 Time 1700
Signature: Printed Name: Company:	Date Time	Signature: Printed Name: Company:	Date Time

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)
Cincinnati 635 West 7th Street, Suite 403, OH 45203 (513) 723-2600
Washington, DC 1710 Goodridge Drive, McLean, VA 22102 (703) 821-4300
Oakridge 800 Oakridge Turnpike, TN 37830 (615) 482-9031
Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100
San Diego 10240 Sorrento Valley Road, Suite 204, San Diego, CA 92121 (619) 587-9071

DATE 09/13/00

DAY	S	M	T	W	Th	F	S
				X			

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear (circled)	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70 (circled)	71-85	86 Up
WIND	Still	Moder (circled)	High	Report No.	
HUMIDITY	Dry (circled)	Moder	Humid	07	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Double J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling):
0706 - on site - Calibrate PID & LEL (Recorded on M&TE Sheet) - 0730 Health and Safety "Tailgate" Briefing Recorded in Managers Log book.
- Plan to Drill two (2) holes in Lonza Property this morning after attending Lonza Safety Orientation Briefing.
- Moving MARSSIM Point from NE Corner of BDE Tank Berm to other preestablished MARSSIM location - This is detailed in Field Change Request No. 004.
- Elevated Gamma dedection along Lonza Fence prompts addition sampling
- Recieve Gamma Walkover Survey Data

1 Sample from 1AC-SB001
" " " SB002
" " 1AA-SB004
" " 1AA-SB005

Samples sent to NTS (Split Lab), Recra, Thermo Retec

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS REPORT NO.: 07

JOB NO.: 01-0513-08-4191-900 DATE: 09/13/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour

PID = >5 ppm

LEL = 10%

O_2 = 19.5%

Health and Safety "Tailgate meeting"

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

SPECIAL NOTES:

Submitted FCR-ØØ4 & FCR-ØØ5

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling

PREPARED BY: Brad Richardson TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/13/00 Page 1 of 4

Task Team Members:
Brad Richardson
Paul Parrish
Joe Schultheis
Pete Ferron
Doug Haas
Tom Schnitzius

Narrative (include time and location):

0700 - At Site; Calibrate PID & LEL and Record on M&TE Sheet. 0710 - Scott Ried from USACE on site; Expect Mat Massik later (from USACE-Buffalo)
Plan - 2 locations drill at Lonza Property
- will have to have Lonza Safety Orientation
- will try to drill through Concrete.
- will patch holes drilled with Quikcrete.

HP's are scanning rig before releasing it onto Lonza Property.
0830 - Drillers (Gene Stradley and Don Malone), Paul Parrish, Pete Ferron, Doug Haas; Tom Schnizius ~~at~~ arr

Daily Weather Condition: A.M. Clear, 60's Breeze

P.M.

Recorded By: [signature] (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS PROJECT NO: 01-0513-08-4191-900

Date: (mm/dd/yy): 09/13/00 Page 2 of 4

Task Team Members:

See Page 1

Narrative (include time and location):

are at The Lonza Site to recieve their Safety Orientation.
- Moving MARSSIM location from NE Corner of BDE Tank berm to some other preestablished MARSSIM location which will be accessible to the Rig - This is detailed in Field Change Request No. ØØ4.
- While setting rig to pilot holes through concrete on Lonza property, H.P.'s detected Gamma Radiation at > 300 K right next to fence; and > ~~20~~ 100K. Spoke w/ Steve Buechi and Scott Reid about collecting addtional bias samples at those locations to determine types of constituent causing Gamma Activity at those

Daily Weather Condition: A.M. Clear, 60's-70's, Breeze

P.M.

Recorded By: [signature] QC Checked by:
(Signature) (Signature)

99-011M(P65)/040899 FTP-1215, Revision 0, 4/07/99

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/13/00 Page 3 of 4

Task Team Members:

See Page 1

Narrative (include time and location):

levels. We will collect 3 additional samples along fence on Lonza property. (Probably tomorrow morning). Recieved Gamma Walkover Data from Ann Jacobs which was done ~~last~~ AB two weeks ago. Appears that areas of concern may need to be expanded - Perhaps additional "bounding" sample locations need to be added. Will have maps of Gamma Walkover sent to Bob Tucker and Steve Buechi. 1300 finish the two boring samples on Lonza - break for Lunch - 1400 back from Lunch. Decon equipment 1500 at the

Daily Weather Condition: A.M.

P.M. Sunny, 70's Breeze

Recorded By: [signature] (Signature) QC Checked by: ______ (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/13/00

Task Team Members:

See Page 1

Narrative (include time and location):

relocated MARSSIMS Point (on south end of Area A) (704955.33/232787.62) Collect Split and Duplicate there. 1615 - Start drilling @ 1AA-SBØØ5; Finish @ 1700 - Decon and Pack sample - Clean site.
1745 Leave Site

Daily Weather Condition: A.M.

P.M. Sunny, 70's, Breeze

Recorded By: [signature] (Signature) QC Checked by: (Signature)

SAIC Science Applications International Corporation
An Employee-Owned Company

Chain of Custody Record

Date 9/13/00 Page 1 of 1

Shipment No. RECRA-005

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY DUBLIN, OH. 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED REMEDIAL INVEST.
Job/P.O. No.
Sampler (Signature) Paul M Parrish (Printed Name) Paul M Parrish

Laboratory Name RECRA ENVIRONMENTAL
Address 208 WELSH POOL RD
LIONVILLE, PA. 19341
Phone (610) 280-3000 EXT 4286
Contact Name JUDY STONE

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	VOC 8260B	SVOC 8270C	Pesticides 8081A	PCB 8082	TAL Metals	Temperature	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	WATER	TB0006	9/13/00	1546	NA	X						1	Trip blank
	WATER	COOLANT	9/13/00	NA	NA						X	1	Field temp. - 4°C
	SOIL	PVSB0010	9/13/00	1546	A/SB0004	X	X	X	X	X		5	
	SOIL	PVSB9002	9/13/00	1546	A/SB0004	X	X	X	X	X		5	

Total Number of Containers: 12

Shipment Method: Fed Ex 8216 3286 9114

Relinquished by	Date	Received by	Date
Signature: E.J. Schultheis	9/13/00	Signature: Federal Express	9/13/00
Printed Name: E. J. SCHULTHEIS	Time 1700	Printed Name:	Time 1700
Company: SAIC		Company:	

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Dayton
1321 Research Park Drive, Dayton, OH 45432
(513) 429-6550

Columbus
655 Metro Place South, Suite 745, Dublin, OH 43017
(614) 793-7600

Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

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Chain of Custody Record

Date 9/13/00 Page 1 of 1

Shipment No. NTS-002

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY. DUBLIN, OH. 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED REMEDIAL INVEST.
Job/P.O. No.
Sampler (Signature) [signature] (Printed Name) Paul M Parrish

Laboratory Name NTS, INC.
Address 635 HEMBREE PARKWAY ROSWELL GA. 30076
Phone (770) 663-0711
Contact Name DR. HERMAN RAO

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	VOC 8260B	SVOC 8270C	Pesticide 8081A	PCB 8082	TAL Metals	Iso-U 238 Alpha Spec	Iso-Th 230 Alpha Spec	Radium 226 Gamma Spec	Temperature					No. of Containers	Observations, Comments, Special Instructions
	Water	TB0007	9/13/00	1546	NA	X													1	Trip blank
	Water	COOLANT	9/13/00	NA	NA									X					1	Field Temp. - 4°C
	SOIL	PVSB9501	9/13/00	1546	A/SB0004	X	X	X	X	X	X	X	X						6	

Relinquished by
E.J. Schultheis
Signature
E. J. SCHULTHEIS
Printed Name
SAIC
Company
Date 9/13/00
Time 1700

Received by
FEDERAL EXPRESS
Signature
Printed Name
Company
Date 9/13/00
Time 1700

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 8

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: Fed Ex 8216 3288 3103

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500
Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031
Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100
Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550
Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600
Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

Radionuclides

SAIC Science Applications International Corporation
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Chain of Custody Record

Date 9/12/00 Page 1 of 1

Shipment No. TRT-005

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY DUBLIN OH 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED RI/FS
Job/P.O. No.
Sampler (Signature) Paul M Parrish (Printed Name) Paul M Parrish

Laboratory Name THERMORETEC
Address 601 SCARBORO RD
OAK RIDGE TN. 37830
Phone (865) 481-0683 EXT. 128
Contact Name MIKE McDOUGALL

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	U^{238} Alpha Spec	Th^{230} Alpha Spec.	Ra^{226} Gamma Spec.	No. of Containers	Observations, Comments, Special Instructions
	SOIL	PVSB0007	9/12/00	1558	IAA	X	X	X	1	1.7-2.5 SB003
	↓	PVSB0109	9/13/00	1150	IAC	X	X	X	1	4.0-4.3 SB001
		PVSB0112	↓	1221	IAC	X	X	X	1	2.0-2.7 SB002
	↓	PVSB0010	↓	1546	IAA	X	X	X	1	0.0-1.0* SB004
	SOIL	PVSB9002	9/13/00	1546	IAA	X	X	X	1	0.0-1.0 SB004

Relinquished by
Signature E.J. Schultheis
Printed Name E.J. Schultheis
Company SAIC
Date 9/13/00
Time 1700

Received by
Signature
Printed Name
Company
Date
Time

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 5

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: Fed Ex 821632883147

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Dayton
1321 Research Park Drive, Dayton, OH 45432
(513) 429-6550

Columbus
655 Metro Place South, Suite 745, Dublin, OH 43017
(614) 793-7600

Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

White: Laboratory *Pink: Project Manager* *Yellow: Project QAO* *Goldenrod: Field Project Manager*

DATE 09/14/00

DAY	S	M	T	W	Th	F	S
					X		

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast (circled)	Rain	Snow
TEMP.	To 32	33-50	51-70 (circled)	71-85	86 Up
WIND	Still	Moder (circled)	High	Report No.	
HUMIDITY	Dry	Moder (circled)	Humid	08	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Double J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling): See Attached Task Team Activity Sheet.
0700 - On Site - Drillers here - Equipment calibrated and recorded on M&TE Sheet.
1000 - Back to Lonza, collect:
1 sample at IAC-SB003
1 " " " SB004 } elevated Gamma along fence
1 " " " SB005
At 1110 Rig's hammer quit functioning before breakdown able to collect:
1 sample at IAA-SB006
1 " at IAA-SB007
1 " " " SB008
1 " " " SB009
1 " " IAA SB010
1 " " " 11
1 " " " SB012

FCR No. 6 : Adding 3 bias samples to interior of Rubble Pile
Samples sent to Thermo Retec and Recra

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS REPORT NO.: 68

JOB NO.: 01-0513-08-4191-900 DATE: 09/14/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour
PID = >5 ppm
LEL = 10%
O_2 = 19.5%

Health and Safety "Tailgate meeting"

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

At 1110 - Rigs hammer apparatus broke down - unable to
At 1315 - Drillers say they will have to field test rig-hammer to confirm whether or not it will work.
Found a lot of paper wasp and yellow jacket nest in and around both Pump Houses where we want to collect foundation samples. Will knock them down tonight w/ wasp killer - hopefully be able to drill there tomorrow - will not collect TCL samples at those locations

SPECIAL NOTES:

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling around Area A

PREPARED BY: Brad Richardson TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/14/00 Page 1 of 4

Task Team Members:

Brad Richardson
Joe Schultheis
Paul Parrish
Pete Ferron
Doug Haas
Tom Schnitzius

Narrative (include time and location):

0700 - On Site, Pete's calibrating PID and LEL (Recorded on M&TE Sheet) Note: Weather Forecast calls for rain starting this afternoon thru Saturday. Since people have to arrange flights home I decided to not work on Saturday based on this mornings forecast (HPs can't see Alpha or Beta on wet surfaces).

0730 - H&S Briefing Held - Recorded in Field Manager Logbook. 0745 - Doug Haas and I bias Locate some of ~~the~~ "Foundation" Sample Location in Area A 0840 - Mat Masset on site. 0900 Call Tom Wilson

Daily Weather Condition: A.M. Partly Cloudy, 60's, Breeze

P.M.

Recorded By: B. Richardson (Signature) QC Checked by: (Signature)

99-011M(P65)/040899 FTP-1215. Revision 0. 4/07/99

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/14/00 Page 2 of 4

Task Team Members:

See Page 1

Narrative (include time and location):

of Lonza: Left message about us going on site to collect additional samples. Bob Tucker is looking over Walkover Gamma Data Maps to determine if and where additional sample locations are - Contacted Tom Wilson - he will meet us at Fence @ 1000. Scott Reid arrives @ 0945. - 1000 at Lonza's Collect 3 surface samples along fence at 2 Gamma-elevated areas (330k & 100k) and 1 sample where gamma activity appears to diminish to 20K. 1135 - Back on site; Rig is down (1110) the hammer is broken so drillers dismantling hammer to

Daily Weather Condition: A.M. Partly Cloudy 60's, Breeze

P.M.

Recorded By: [signature] QC Checked by:
(Signature) (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/14/00

Task Team Members:

See Pg 1

Narrative (include time and location):

determine problem. Decon equipment 1200 Lunch 1315 - Drillers take Lunch - say that rig may be fixed. Don Malone said he did not know what was/is wrong with it but after he put it back together the hammer was working, but not under stress. ∴ will have to field test after Lunch. 1340 drillers leave to get deconed equipment and rig - will meet Paul Parrish and Pete Ferron and HP at Area A for field test. The Foundations around both pump house are infestated w/ paper wasps and yellow jackets. We need foundation samples there. We will knock the

Daily Weather Condition: A.M.

P.M. Cloudy, 60-70, Breeze

Recorded By: [signature] (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/14/00

Page 4 of 4

Task Team Members:

See Pg 1

Narrative (include time and location):

critters tonight so we can drill there tomorrow (will not sample TCL at those locations). ~~@~~ 1415 starting to rain off and on (very light). Drilling at IAA-SB010. 1510 Start drilling at SB011. 1540 Start drilling at SB012. 1635 - Finish@ SB012 Begin Decon, and Wasp spraying. cleanup Raining hard - Leave site at 1530

Daily Weather Condition: A.M. Rain 70, Calm

P.M.

Recorded By: [signature] (Signature)

QC Checked by: (Signature)

Chain of Custody Record

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Date 9/13/00 Page 1 of 1

Shipment No. TRT-006

Name BRAD RICHARDSON
Address 1900 BLAZER PKWY. DUBLIN, OH. 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED RI/FS INVEST
Job/P.O. No.
Sampler (Signature) Paul Parrish (Printed Name) Paul M Parrish

Laboratory Name THERMORETEC
Address 601 SCARBORO RD
OAK RIDGE TN. 37830
Phone (865) 481-0683 Ex. 128
Contact Name MIKE McDOUGALL

Requested Parameters: U^{238} Alpha Spec.; Th^{230} Alpha Spec.; Ra^{226} Gamma Spec.

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	U^{238} Alpha Spec.	Th^{230} Alpha Spec.	Ra^{226} Gamma Spec.	No. of Containers	Observations, Comments, Special Instructions
	SOIL	PVSB0013	9/13/00	1627	IAA	X	X	X	1	SB005 0.0-1.0
	↓	PVSB0016	9/14/00	0900	↓	X	X	X	1	0.0-1.0 SB006
		PVSB0019	↓	0935		X	X	X	1	0.5-1.5* SB007
		PVSB9003		0935		X	X	X	1	0.5-1.5 SB007
		PVSB0022		1050		X	X	X	1	0.0-1.0 SB008
		PVSB0025		1108		X	X	X	1	0.0-1.0 SB009
	↓	PVSB0028	↓	1454	↓	X	X	X	1	1.0-2.0 SB010
	SOIL	PVSB0110	9/14/00	1030	C/SB003	X	X	X	1	0.0-0.5' SB003
	SOIL	PVSB0113	9/14/00	1100	C/SB004	X	X	X	1	0.0-0.7' SB004
	SOIL	PVSB0111	9/14/00	1120	C/SB005	X	X	X	1	0.0-0.5' SB005

Total Number of Containers: 10
Shipment Method: FedEx 8216 3288 2997

Relinquished by	Date	Received by	Date
Signature: E.J. Schultheis Printed Name: E.J. SCHULTHEIS Company: SAIC	9/14/00 Time 1700	Signature Printed Name Company	Time
Relinquished by Signature Printed Name Company	Date Time	Received by Signature Printed Name Company	Date Time

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500

Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031

Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100

Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550

Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600

Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

SAIC Science Applications International Corporation
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Chain of Custody Record

Date 9/14/00 Page 1 of 1

Shipment No. RECRA-006

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY DUBLIN, OH. 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED RI/FS INVEST.
Job/P.O. No.
Sampler (Signature) Paul [signature] (Printed Name) Paul M Parrish

Laboratory Name RECRA ENVIRONMENTAL
Address 208 WELSH POOL RD. LIONVILLE, PA. 19341
Phone (610) 280-3000 Ex. 4286
Contact Name JUDY STONE

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	VOC 8260B	SVOC 8270C	Pesticides 8081A	PCB 8082	TAL Metals	CN⁻	Temperature	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	SOIL	PVSB0019	9/14/00	0935	A/SB0007	X	X	X	X	X	X		5	3 Encore samplers/bag
	WATER	TB0008	9/14/00	0935	NA	X							1	Trip blank
	WATER	COOLANT	9/14/00	NA	NA							X	1	Field temp - 4°C

Relinquished by	Date	Received by	Date
Signature: E.J. Schultheis Printed Name: E.J. SCHULTHEIS Company: SAIC	9/14/00 Time 1700	Signature Printed Name Company	Time
Relinquished by Signature Printed Name Company	Date Time	Received by Signature Printed Name Company	Date Time

Total Number of Containers:

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: FedEx 8216 3288 3217

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500

Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031

Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100

Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550

Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7000

Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

SAIC/EEMG

HP-405, REV.0
Attachment 1

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

Page 1 of 1

SURVEY LOCATION: Main office building

DATE: 9-14-2000 TIME: 1455

PURPOSE OF SURVEY: Contamination control for samples

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	109535 / 119481	9-11-01 / 9-11-01	1α / 92β	37.8% / 33.2%
2224 / 43-89	163739 / 169232	6-25-01 / 6-25-01	0α / NA	15% / NA
N/A	N/A	N/A	N/A	N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Swipe of 5 sample containers	1	< 23	21	< 144				
swipe of 2nd 5 sample containers	1	< 23	0	< 144				
Swipe of last 4 sample containers and trip blank	2	< 23	4	< 144				
Swipe from Louza borehole 3 including poly & sample container.	2	< 23	8	< 144				
Swipe from sample taken at IA "A" #	5	< 23	30	< 144			N/A	
		N/A						

REMARKS: Direct frisks ~~calc~~ did not show any fixed contamination above the minimum detectable limit (for α) on any of the sample containers.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 _______ /

REVIEWER SIGNATURE/DATE: _______ /

DATE 09/15/00

DAY	S	M	T	W	Th	F	S
						X	

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No. 09	
HUMIDITY	Dry	Moder	Humid		

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Doble J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling): See Attached Task Team Activity Sheet
0700 - On Site - Equipment Calibrated and recorded on M&TE Sheet.
0800 - Drilling on Area A - Doug & T located more locations using Gamma Detection.
1008 - Over at Rubble Pile to collect "biased" Rubble Pile Samples
- 1 Sample at Rubble Pile (0"-6") 1ARP-SB011
- 1 " " " SB012
- 1 " " " SB013
Samples collected in Area "A"
- 1 Sample at Area "A" 1A~~A~~ -SB0013
1 " " " SB0014
1 " " " SB0015
1 " " " SB0016
1 " " " SB0017
1 " " " SB0018
1 " " " SB0019
1 " " " SB0020

Samples sent Recra lab, Thermo-Retec, GEL

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS

REPORT NO.: 09

JOB NO.: 01-0513-08-4191-900

DATE: 09/15/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour
PID = >5 ppm
LEL = 10%
O_2 = 19.5%
Health and Safety "Tailgate meeting"

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

–

SPECIAL NOTES:

Reviewing Gamma Walkover Survey Data w/ Sook Reid in Preparation to conference call w/ Steve Buechi

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling

PREPARED BY: Brad Richardson

TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/15/00 Page 1 of 3

Task Team Members:

Brad Richardson
Joe Schultheis
Paul Parrish
Pete Ferron
Doug Haas
Tom Schnitzius

Narrative (include time and location):

0700 - On Site, Drillers arrive (Don Malone and Gene Stradley). Equipment Calibrated (PID & LEL) and recorded on M&TE Sheet. 0730. Health and Safety "Tailgate" Briefing held and recorded in Field Managers Logbook. 0800 - Start drilling at Area A at SB013; Doug and I using 2x2 Gamma Detector, locate additional sample locations "biasly" in Area A (Track, Spill Basin, Foundation and Tank locations) 0900 Scott Reid on site. 0930 Steve Love and Nancy Zikmanis on site, from OEPA. 1000 Doug and Scott go to Rubble Pile

Daily Weather Condition: A.M. Cloudy, 50s-60, Windy

P.M.

Recorded By: Brad Richardson (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/15/00 Page 2 of 3

Task Team Members:

See Pg 1

Narrative (include time and location):

and scanning eastern half of pile prior to bias sampling hot spots from surface. Nancy and Steve walking site. Joe is labeling Decon Rinse Water waste Drums, COCs faxed to Data Management.
1050 - Head over to Rubble Pile to collect additional "bias" samples. - Doug Haas and Sook Reid had marked locations w/in eastern section of Rubble Pile that had high gamma activity. Collected three (3) surface (0"-6") soil samples from those locations. Note The background gamma activity was 7556 cpm (from one minute integrated count) and samples from SB0011,

Daily Weather Condition: A.M. Cloudy, 50's - 60's Windy

P.M.

Recorded By: [signature] (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS PROJECT NO: 01-0513-08-4191-900

Date: (mm/dd/yy): 09/15/00 Page 3 of 3

Task Team Members:

See Pg 1

Narrative (include time and location):

SB0012, & SB0013 had counts at 19,798; 35,780 & 11,986 cpm, respectively. 1215 Break for Lunch 1300 - Back from Lunch - Drillers in Area A still. 1330 Spoke w/ Tom Wilson about filling holes w/ bentonite. Also asked him to look for DOE Scan documents on excavated material that Nancy Zikmanis requested. He said ~~all~~ the excavations had been deemed clean and that they were located 100's of feet away from where we are investigating. 1400 - Went to Lonza Property to fill holes w/ bentonite chips and hydrate. Decon and clean site leave site @ 16:00

Daily Weather Condition: A.M.

P.M. Mostly cloudy, 60's, Windy

Recorded By: [signature] (Signature) QC Checked by: (Signature)

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An Employee-Owned Company

Chain of Custody Record

Date 9/13/00 Page 1 of 1

Shipment No. GEL-004

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY DUBLIN, OH. 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED RI/FS INVEST.
Job/P.O. No.

Sampler (Signature) (Printed Name)

Laboratory Name GENERAL ENGINEERING
Address 2040 SAVAGE RD
CHARLESTON, SC 29417
Phone (843) 556-8171
Contact Name JAMES STELLING

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	GRAIN SIZE ASTM422	ATTERBERG ASTM4318	MOISTURE ASTM 2216	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	SOIL	PVSB0011	9/13/00	1550	A/SB0004	X	X	X	1	4.0-5.5'
	SOIL	PVSB0020	9/14/00	1000	A/SB0007	X	X	X	1	8.0-9.4'
	SOIL	PVSB0038	9/15/00	0837	A/SB0013	X	X	X	1	6.0-8.0'

Relinquished by
Signature E.J. Schultheis
Printed Name E.J. SCHULTHEIS
Company SAIC
Date 9/15/00
Time 1700

Received by
Signature
Printed Name
Company
Date
Time

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 3

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: FED EX 8216 3288 3033

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Dayton
1321 Research Park Drive, Dayton, OH 45432
(513) 429-6550

Columbus
655 Metro Place South, Suite 745, Dublin, OH 43017
(614) 793-7600

Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

SAIC Science Applications International Corporation
An Employee-Owned Company

Chain of Custody Record

Date 9/15/00 Page 1 of 1

Shipment No. RECRA-007

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY DUBLIN OH. 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED RI/FS INVEST.
Job/P.O. No.

Sampler (Signature) E.J. Schultheis (Printed Name) E.J. Schultheis

Laboratory Name RECRA ENVIRONMENTAL
Address 208 WELSH POOL RD. LIONVILLE PA. 19341
Phone (610) 280-3000 Ext 4286
Contact Name JUDY STONE

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	VOC 8260B	SVOC 8270C	Pesticide 8081A	PCB 8082	TAL Metals	Cyanide	Temperature							NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	WATER	TB0069	9/15/00	0833	NA	X													1	Trip blank
	WATER	COOLANT	9/15/00	NA	NA							X							1	Field temp. 4°C
	SOIL	PVSB0037	9/15/00	0833	A/SB0013	X	X	X	X	X	X								5	3 Encore samplers / bag
	SOIL	PVSB0043	9/15/00	0952	A/SB0015	X	X	X	X	X	X								5	3 Encore samplers / bag
	SOIL	PVSB0049	9/15/00	1313	A/SB0017	X	X	X	X	X	X								5	3 Encore samplers / bag

Relinquished by	Date	Received by	Date
Signature: E.J. Schultheis Printed Name: E.J. SCHULTHEIS Company: SAIC	9/15/00 Time 1700	Signature Printed Name Company	Time
Relinquished by Signature Printed Name Company	Date Time	Received by Signature Printed Name Company	Date Time

Total Number of Containers: 17

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: FED EX 8216 3288 3000

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500
Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031
Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100
Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550
Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600
Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

Science Applications International Corporation
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Chain of Custody Record

Date 9/14/00 Page 1 of 1

Shipment No. TRT-007

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY. DUBLIN, OH. 43017
Phone Number (614) 793-7600
Project Manager BRAD RICHARDSON
Project Name PAINESVILLE FOCUSED RI/FS INVEST.
Job/P.O. No.
Sampler (Signature) Paul M Parrish (Printed Name) Paul M Parrish

Laboratory Name THERMO RETEC
Address 601 SCARBORO RD OAK RIDGE TN. 37830
Phone (865) 481-0683 Ex. 128
Contact Name MIKE MCDOUGALL

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Iso U 238 Alpha Spec.	Iso Th 230 Alpha Spec.	Ra 226 Gamma Spec.	No. of Containers	Observations, Comments, Special Instructions
	SOIL	PVSB0031	9/14/00	1527	A/SB0011	X	X	X	1	0.7-1.2'
	SOIL	PVSB0034	9/14/00	1605	A/SB0012	X	X	X	1	0.0-0.5'
	SOIL	PVSB0037	9/15/00	0833	A/SB0013	X	X	X	1	0.0-1.0' *
	SOIL	PVSB0040	9/15/00	0905	A/SB0014	X	X	X	1	5.9-7.4'
	SOIL	PVSB0043	9/15/00	0952	A/SB0015	X	X	X	1	0.0-1.0' *
	SOIL	PVSB0046	9/15/00	1042	A/SB0016	X	X	X	1	0.0-1.0'
	SOIL	PVSB0049	9/15/00	1313	A/SB0017	X	X	X	1	0.0-1.0' *
	SOIL	PVSB0052	9/15/00	1338	A/SB0018	X	X	X	1	1.75-2.5'
	SOIL	PVSB0191	9/15/00	1140	RP/SB0011	X	X	X	1	0.0-0.5'
	SOIL	PVSB0192	9/15/00	1155	RP/SB0012	X	X	X	1	0.0-0.5'
	SOIL	PVSB0193	9/15/00	1205	RP/SB0013	X	X	X	1	0.0-0.5'
	SOIL	PVSB0055	9/15/00	1407	A/SB0019	X	X	X	1	0.5-1.5'
	SOIL	PVSB0058	9/15/00	1441	A/SB0020	X	X	X	1	0.0-1.0'

Total Number of Containers: ~~13~~ 14 EJ

Shipment Method: FED EX 8216 3288 3011

Relinquished by	Date	Received by	Date
Signature: E.J. Schultheis	9/15/00	Signature:	
Printed Name: E.J. Schultheis	Time: 1700	Printed Name:	Time:
Company: SAIC		Company:	

Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time:	Printed Name:	Time:
Company:		Company:	

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

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(201) 599-0100

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(513) 429-6550

Columbus
655 Metro Place South, Suite 745, Dublin, OH 43017
(614) 793-7600

Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

White: Laboratory *Pink: Project Manager* *Yellow: Project QAO* *Golder* *old Project Manager*

DATE 09/18/00

DAY	S	M	T	W	Th	F	S
		X					

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	010	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Double J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling): See Attached Task Team Activity Sheet.
0700 - On Site, Sook Reid (USACE) on site; 0745: Drillers on site (Don Malone, Gene Stradley) getting loaded w/ water

1-Sample at Area "A" IAA-SB0021
1 " " " SB0022
1 " " " SB0023
1 " " " SB0024
1 " " " SB0025
1 " " " SB0026
1 " " " SB0027
1 " " " SB0028
1 " " " SB0029
Sent samples to Recra lab.

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS REPORT NO.: 010

JOB NO.: 01-0513-08-4191-900 DATE: 09/18/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour

PID = >5 ppm

LEL = 10%

O_2 = 19.5%

Health and Safety "Tailgate meeting"

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

SPECIAL NOTES:

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling

PREPARED BY: Brad Richardson TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/18/00 Page 1 of 4

Task Team Members:

Brad Richardson
Joe Schultheis
Pete Ferron.
Doug Haas
Darrell Landers

Narrative (include time and location):

0700 - On Site; Sook Reid (USACE) arrives.
0745 - Drillers (Don Malone, Gene Stradley) on site.
HP's (Doug Haas & Darrell Landers) on site. Driller's preping for day, loading-up w/ water. 0820 - Pete Ferron on site; Health & Safety Briefing Recorded in logbook
Note: In anticipation of possible extention of work due to Gamma Walkover Survey, asked drillers and HP's about their availability for next week. Still questionable but probably able to work something out if need be.
Equipment calibrated (PID & LEL) - recorded on M&TE
According to original proposed scope of work we have

Daily Weather Condition: A.M. Clear, 70's, Breeze

P.M.

Recorded By: [signature] (Signature) QC Checked by: (Signature)

800

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/18/00 Page 2 of 4

Task Team Members:

See Pg 1

Narrative (include time and location):

13 samples remaining (2 track, 3 Spill Basin, 4 foundation and 4 tank): Sook Reid would like us to go back to SB0012 (Area A hot spot) to resample area since the Gamma Detector saw normal (background levels). 0930 - Conference Call w/ Brad Richardson, Sook Reid, Doug Haas, Bob Tucker, Steve Buechi, & Jeff Dick to discuss extention of sample locations based on Gamma Walkover Survey. Desicions and sampling protocol are provided in Field Change Request No. 007. 1100 - Drill Rig hammer

Daily Weather Condition: A.M. Clear 60's Breeze

P.M.

Recorded By: [signature] (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/18/00 Page 3 of 4

Task Team Members:

See Pg 1

Narrative (include time and location):

apparatus down. In Area A - Sampled locations SB0021, SB0022, SB0023. Hand Augered SB0024 from BDE Tank Pylon. 1230 - Rig is working. 1300 break for Lunch 1400 back from lunch Drilling Area A. 1500 Finish SB0025 set up on SB0026 (NW corner of BDE Tank Embankment) Doug Haas conducting walkover. Tom Wilson w/ Lonza said he will let me know when we can access the rail siding. Either Wed or Thurs, or Fri. The sooner the better. Jim Karston called (1600) to say he will be on site on Wednesday w/ the

Daily Weather Condition: A.M. ________

P.M. Clear, 70's Breeze

Recorded By: [signature] (Signature) QC Checked by: ________ (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/18/00

Task Team Members:

See Pg. 1.

Narrative (include time and location):

contractors who are doing the PRP search. They will all need a Site Specific H&S Briefing.

1730 - Drilling stopping -

Daily Weather Condition: A.M.

P.M. Clear 70's

Recorded By: [signature] (Signature) QC Checked by: (Signature)

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Chain of Custody Record

Date 9/18/00 Page 1 of 1

Shipment No. RECRA-008

Name Brad Richardson
Address 4900 Blazer Pkwy. Dublin OH 43017
Phone Number (614) 793-7600
Project Manager Brad Richardson
Project Name Parrsville Focused RI/FS Invest.
Job/P.O. No.

Sampler (Signature) E.J. Schulthies (Printed Name) E.J. Schulthies

Laboratory Name Recra Lionville [illegible]
Address 208 Welsh Pool Rd.
Lionville PA 19341
Phone (610) 280-[illegible]
Contact Name Judy Stone

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	VOC	SVOC	Pesticides	PCB	TAL Metals	Cyanide	Temperature							NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	WATER	TB0010	9/18/00	1045	NA	X													1	Trip blank
	WATER	COOLANT	9/18/00	NA	NA							X							1	Field Icing 4°C
	SOIL	PVSB0067	9/18/00	1058	A/SB0023	X	X	X	X	X	X								5	3 Encore Samplers / [illegible]
	SOIL	PVSB0073	9/18/00	1437	A/SB0025	X	X	X	X	X	X								5	3 Encore Samplers / [illegible]

Relinquished by
A.B. Richardson
Signature
A B Richardson
Printed Name
SAIC
Company

Date 9/18/00
Time 1530

Received by
Signature
Printed Name
Company

Date
Time

Relinquished by
Signature
Printed Name
Company

Date
Time

Received by
Signature
Printed Name
Company

Date
Time

Total Number of Containers: 12

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method:

SAIC Location (circle)
Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500
Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031
Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100
Dayton
1321 Research Park Drive, Dayton, OH 45432
(513) 429-6550
Columbus
655 Metro Place South, Suite 745, Dublin, OH 43017
(614) 793-7600
Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

DATE 09/19/00

DAY	S	M	T	W	Th	F	S
			X				

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	011	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Double J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling): See Task Team Activity Sheet
0700 - On Site - Calibrate Equip. Recorded on M&TE Sheet
0720 - H&S Tailgate Briefing - Recorded in Field Logbook
0800 - Drilling @ Area A

1 sample @ Area A from SB0030
1 " " " SB0031
1 " " " SB0032
1 " " " SB0033 MS/MSD
1 " " " SB0034 Split
1 " " " SB0035
1 " " " SB0036
1 " Area G " SB0001 (Extra)
1 " Area D " SB001
1 " " " SB002

Sent samples to Thermo-Retec, Split Lab - NTS, Recra and GEL.

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS

REPORT NO.: 09/19/00

JOB NO.: 01-0513-08-4191-900

DATE: No. 011

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour
PID = >5 ppm
LEL = 10%
O_2 = 19.5%
Health and Safety "Tailgate meeting"

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

SPECIAL NOTES: Completed collection of Geotechnical samples.

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling
Jim Karten and PRP contractors on site

PREPARED BY: Brad Richardson

TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/19/00 Page 1 of 1

Task Team Members:
Brad Richardson
Pete Ferron
Joe Schultheis
Doug Haas
Darrell Landers
Dave Lyerla

Narrative (include time and location):

0700 - Additional HP on Site (Dave Lyerla) to help with Gamma Walkover Survey. Health and safety briefing (recorded in field manager logbook). PID and LEL calibrated (recorded on M&TE Sheet. 0800 - Drillers @ Area A 0830 - Doug and Dave Finishing Walkover (filling gaps of survey). Scott Reid on site. Lunch 12:30-13:30 - Drilling "extra" locations at area "G" & "D". Ship samples

Daily Weather Condition: A.M. Clear, 60's

P.M.

Recorded By: [signature] (Signature) QC Checked by: (Signature)

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Date 9/15/00 Page 1 of 1

Shipment No. GEL-005

Name Brad Richardson
Address 4900 Blazer Pkwy, Dublin, OH 43017
Phone Number (614) 793-7600
Project Manager Brad Richardson
Project Name Painesville FUSRAP RI/FS Invest.
Job/P.O. No.

Sampler (Signature) (Printed Name)

Laboratory Name General Engineering
Address 2040 Savage Rd
Charleston, SC. 29417
Phone (843) 556-8171
Contact Name James Stelling

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Grain Size ASTM 422	ATTERBERG ASTM 4318	MOISTURE ASTM 2216											NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	SOIL	PVSB0041	9/15/00	0911	A/SB0014	X	X	X												8.0'-9.5'
	SOIL	PVSB0056	9/15/00	1409	A/SB0019	X	X	X												12.0'-14.0'
	SOIL	PVSB0085	9/18/00	1715	A/SB0029															8.0-10.0'
	SOIL	PVSB0073	9/18/00	1455	A/SB0025															6.0-8.0
	SOIL	PVSB0079	9/18/00	1600	A/SB0027															8.0'-10.0'
	SOIL	PVSB0091	9/19/00	0845	A/SB0031															8.0-9.0'

Relinquished by	Date	Received by	Date
Signature: [signature]	9/19/00	Signature	
Printed Name: A B Richardson	Time 1630	Printed Name	Time
Company: SAIC		Company	

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Total Number of Containers:

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: 8216-3288-3044

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Dayton
1321 Research Park Drive, Dayton, OH 45432
(513) 429-6550

Columbus
655 Metro Place South, Suite 745, Dublin, OH 43017
(614) 793-7600

Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

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Chain of Custody Record

Date 9/14/00 Page 1 of ____

Shipment No. NTS-003

Name Brad Richardson
Address 4900 Blazer Pkwy, Dublin, OH 43017
Phone Number 614 793-7600
Project Manager Brad Richardson
Project Name Painesville RI/FS
Job/P.O. No.

Sampler (Signature) [signature] (Printed Name) A Brad Richardson

Laboratory Name NTS, Inc
Address 635 Hembree Parkway Roswell GA 30076
Phone (770) 663 0711
Contact Name Dr. H Rao

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Iso-U238 Alpha Spec	Iso-Th 230 Alpha Spec.	Radium 226 Gamma Spec	VOC 8260B	SVOC 8270C	Pest 8081A	PCB 8082	TAL Metals	Temperature	No. of Containers	Observations, Comments, Special Instructions
	Soil	PVSB9502	9/14/00	09:35	A/SB0007	X	X	X							1	
	Soil	PVSB9503	9/18/00	1058	A/SB0023	X	X	X							1	
	Soil	PVSB9504	9/18/00	1227	A/SB0024	X	X	X							1	
	Soil	PVSB9505	9/19/00	1053	A/SB0024	X	X	X	X	X	X	X	X	~~X~~ NBR	6	3 Encore/Bay
	Water	Coolant	9/19/00	NA	NA									X	1	
	Water	TB0011	9/19/00	0720	NA				X						1	
	Soil	PVSB9506	9/19/00	1418	A/SB0086	X	X	X							1	

Total Number of Containers: 12

Shipment Method: 8316-3288-3088

Relinquished by
Signature [signature]
Printed Name A Brad Richardson
Company SAIC
Date 9/19/00
Time 1630

Received by
Signature
Printed Name
Company
Date
Time

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Dayton
1321 Research Park Drive, Dayton, OH 45432
(513) 429-6550

Columbus
655 Metro Place South, Suite 745, Dublin, OH 43017
(614) 793-7600

Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

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Chain of Custody Record

Date 9-19-00 Page 1 of 1

Shipment No. Recra-009

Name Brad Richardson
Address 4900 Blazer Pkwy, Dublin, OH 43017
Phone Number (614) 793-7600
Project Manager B Richardson
Project Name Painesville FUSRAP RI/FS
Job/P.O. No.

Sampler (Signature) [signature] (Printed Name) A Brad Richardson

Laboratory Name Recra Environmental
Address 208 Welsh Pool Rd
Lionville, PA 19341
Phone (610) 280-3000 Ext. 4286
Contact Name Judy Stone

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	VOC	SVOC	Pesticides	PCB	TAL Metals	Cyanide	Temperature							NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	Water	TB0012	9/19/00	0720	NA	X													1	Trip Blank
	Water	Coolant	"	NA	NA							X							1	Field Temp 4°C
	Soil	PVSB0088	9/19/00	0822	A/SB0030	X	X	X	X	X	X								5	3 Encore / Bag
	↓	PVSB9006	↓	0822	A/SB0030	↓	↓	↓	↓	↓	↓								5	3 Encore / Bag
	↓	PVSB0091	↓	0840	A/SB0031	↓	↓	↓	↓	↓	↓								5	" "
	↓	PVSB0094	↓	0920	A/SB0032	↓	↓	↓	↓	↓	↓								5	" "
	↓	PVSB0097	↓	0955	A/SB0033	↓	↓	↓	↓	↓	↓								8	" " MS/MSD
	↓	PVSB0100	↓	1053	A/SB0034	↓	↓	↓	↓	↓	↓								5	" "
	↓	PVSB0106	↓	1418	A/SB0036	↓	↓	↓	↓	↓	↓								5	" "

Relinquished by	Date	Received by	Date
Signature: [signature]	9/19/00	Signature	
Printed Name: A Brad Richardson	Time 1630	Printed Name	Time
Company: SAIC		Company	

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Total Number of Containers: 41

Shipment Method: 8216-3288-3066

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

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(615) 482-9031

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(513) 429-6550

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(614) 793-7600

Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

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Date 9/18/00 Page 1 of 2

Shipment No. TRT-008

Name BRAD RICHARDSON
Address 4900 BLAZER PKWY., DUBLIN OH 43017
Phone Number (614) 793-7600
Project Manager B Richardson
Project Name Painesville FUSRAP RI/FS
Job/P.O. No.

Sampler (Signature) [signature] (Printed Name) A Brad Richardson

Laboratory Name THERMO-RETEC
Address 601 SCARBORO Rd. OAK RIDGE, TN 37830
Phone (865) 481-0683 Ex 128
Contact Name MIKE McDOUGALL

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Iso U 238 Alpha Spec	Iso Th 230 Alpha Spec	Ra 226 Gamma Spec	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	SOIL	PVSB0061	9/18/00	0958	A/SB0021	X	X	X	1	
		PVSB9004		0958	A/SB0021				1	
		PVSB0064		1018	A/SB0022				1	
		PVSB0067		1058	A/SB0023				1	
		PVSB0070		1227	A/SB0024				1	
		PVSB0073		1437	A/SB0025				1	
		PVSB0076		1520	A/SB0026				1	
		PVSB9005		1520	A/SB0026				1	
		PVSB0079		1553	A/SB0027				1	MS/MSD
		PVSB9007		1553	A/SB0027				1	
		PVSB0082		1648	A/SB0028				1	
		PVSB0085		1710	A/SB0029				1	
		PVSB0088	9/19/00	0822	A/SB0030				1	

Relinquished by	Date	Received by	Date
Signature [signature]	9/19/00	Signature	
Printed Name A Brad Richardson	Time 1630	Printed Name	Time
Company SAIC		Company	

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Total Number of Containers: ~~8216-3288~~ 13

Shipment Method: 8216-3288-3055

Instructions ~~AR 3055~~

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500

Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031

Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100

Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550

Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600

Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

Chain of Custody Record

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Date 9/19/00 Page 2 of 2

Shipment No. TRT-008

Name B Richardson
Address 4900 Blazer Pkwy, Dublin OH 43017
Phone Number (614) 793-7600
Project Manager B Richardson
Project Name Painesville FUSRAP RI/FS
Job/P.O. No.
Sampler (Signature) (Printed Name) A Brad Richardson

Laboratory Name THERMO-RETEC
Address 601 Scarboro Rd. Oak Ridge, TN 37830
Phone (865) 481-0683 Ex 128
Contact Name Mike McDougall

Requested Parameters: Iso U 238 Alpha Spec; Iso Th 230 Alpha Spec; Radium 226 Gamma Spec

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Iso U 238 Alpha Spec	Iso Th 230 Alpha Spec	Radium 226 Gamma Spec	No. of Containers	Observations, Comments, Special Instructions
	Soil	PVSB0006	9/19/00	0822	A/SB0030	X	X	X	1	
		PVSB0091		0810	A/SB0031	X	X	X	1	
		PVSB0094		0920	A/SB0032	X	X	X	2	MS/MSD
		PVSB0097		0957	A/SB0033	X	X	X	1	
		PVSB0100		1053	A/SB0034	X	X	X	1	
		PVSB0103		1145	A/SB0035	X	X	X	1	
		PVSB0106		1418	A/SB0036	X	X	X	1	

Relinquished by	Date	Received by	Date
Signature: [signature] Printed Name: A Brad Richardson Company: SAIC	9/19/00 Time 1630	Signature: Printed Name: Company:	Time
Relinquished by Signature: Printed Name: Company:	Date Time	Received by Signature: Printed Name: Company:	Date Time

Total Number of Containers: 21

Shipment Method: 8216-3288-3055

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500
Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031
Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100
Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550
Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600
Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

DATE 09/20/00

DAY	S	M	T	W	Th	F	S
				X			

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	012	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Dable J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling): See Task Team Activity Sheet.
0700 - On Site - Equip. Calibrated (Recorded on M&TE Sheet)
0730 - H&S Briefing Tailgate
0740 - At Area "A" using hand augers to sample tank pylon and south BDE Tank berm.
1020 - Pete Ferron and Doug Haas conduct Site Specific Health and Safety Briefing To Nancy Zikmanis (OEPA), Jim Karsten and his assembled guests (USACE and "Hydrogeologic, Inc" personnel)

1	Sample	collected @	Area "D"	IAD-SB003
1	"	"	"	" SB004
1	"	"	Area "A"	IAA-SB0037
1	"	"	"	" SB0038
1	"	"	Area "B"	IAB-SB0001
1	"	"	"	" SB0002
1	"	"	Area "C"	IAC-SB0006
1	"	"	"	" SB0007

Send samples to NTS (Split), GEL, and Recra.

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS

REPORT NO.: 012

JOB NO.: 01-0513-08-4191-900

DATE: 09/20/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = ·5 mrem/hour

PID = >5 ppm

LEL = 10%

O_2 = 19.5%

Health and Safety "Tailgate meeting"

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

Rig's geoprobe hammer breaks - will revert to collecting continuous samples using split spoons - same sampling/scanning protocol as described in the SAP and appending FCRs will still be followed.

SPECIAL NOTES:

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling

-Access To Lonza Property

PREPARED BY: Brad Richardson

TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS PROJECT NO: 01-0513-08-4191-900

Date: (mm/dd/yy): 09/20/00 Page 1 of 4

Task Team Members:

Brad Richardson

Pete Ferron

Joe Schultheis

Darrell Landers

Doug Haas

Narrative (include time and location):

0700 - On Site - Calibrate PID & LEL Recorded on M&TE Sheets. Health & Safety Tailgate Meeting 0740 - Hand Auger Sample locations in Area "A" (BDE Tank Pylon and South Berm). Doug Haas using GPS to locate the points that have been sampled. 0900 Drillers over at Area "D" getting remaining soil sample location (SB003 and SB004) Nancy Zikman's on site @ 0905. Stephen Buechi and Steve Barge (SP) on site @ 1000. 10:15 Jim Karsten, Michelle Barezak and Tim Byrnes on site for meeting w/contractors

Daily Weather Condition: A.M. Clear, 70's, Windy

P.M.

Recorded By: [signature] (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/20/00 Page 2 of 4

Task Team Members:

See Page 1

Narrative (include time and location):

conducting PRP investigation; Kevin K Fink, Jim Kool, Jodie Johnson, Paul Spalding of Hydrogeologic. 10:20 - Pete Ferron and Doug Haas conduct site specific health and safety briefing to all on site who may be entering roped areas. With Steve Buechi and Doug Haas, locate additional sample points on north side of Area "B" (one is on the "oil tank" containment embankment.). 10:40 The rig's hammer quit functioning - driller get finished out of Area D and go back to decon

Daily Weather Condition: A.M. Clear, 70's, Windy

P.M.

Recorded By: [signature] (Signature) QC Checked by: ______ (Signature)

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/20/00 Page 3 of 4

Task Team Members:

See Pg 1

Narrative (include time and location):

pad to repair it. 1200 - Break for Lunch. 1300 Back from Lunch - Drillers set up on embankment containment (for Oil Storage Container) north of Area "B" (SB002). 1400 - Rig's hammer is broken (apparently for good) - Will have to proceed using a split spoon to collect continuous samples. Find out that last Thursday's Fed Ex to Recra labs was not delivered until Monday and temp. was above 4°C. Container contained Sample # PVSB0019 from 0.5-1.5 BGS @ IAA-SB0007. Since that sample was collected for Full Suite Biasly

Daily Weather Condition: A.M. Clear, 70's, Windy

P.M. Clear, 70s-80's Windy

Recorded By: [signature] (Signature) QC Checked by: ________ (Signature)

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/20/00

Page 4 of 4

Task Team Members:

See Pg 1

Narrative (include time and location):

based on a field PID hit of 1100ppm, We will ~~also~~ AKR re collect that sample descretely from 0.5'-1.5' 1500 - Drillers finish at 1AB-SB001. Head over to Lonza (Area C - to drill bounding sample location SB006 (South side of Rail Siding Gate, next to landfill gas line). 1630 - Drillers @ 1AC-SB007 - Thru concrete. - 1800 finishing up on Lonza. - Need to call Tom Wilson about utility clearance on the north Lonza points. Decon + clean-up, 1830 - leave site.

Daily Weather Condition: A.M.

P.M. Clouding. Threat of Rain 70's Wind

Recorded By: A Brad [signature] (Signature)

QC Checked by: (Signature)

99-011M(P65)/040899

FTP-1215. Revision 0. 4/07/99

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Chain of Custody Record

Date 09/20/00 Page 1 of 1

Shipment No. NTS-004

Name Brad Richardson
Address 4900 Blazer Pkwy, Dublin, OH 43017
Phone Number (614) 793-7600
Project Manager Brad Richardson
Project Name Painesville RI/FS
Job/P.O. No.

Sampler (Signature) Brad Richardson (Printed Name) A Brad Richardson

Laboratory Name NTS, Inc
Address 635 Hembree Pkwy Roswell GA 30076
Phone (770) 663-0711
Contact Name Dr. H. Rao

Requested Parameters: Iso-U 238 Alpha Spec; Iso-Th 230 Alpha Spec; Ra 226 Gamma Spec; ~~VOC 8260B~~; ~~SVOC 8270C~~; ~~Pest. 8081A~~; ~~PCB 8082~~; ~~TAL Metals~~; ~~Temperature~~

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Iso-U 238 Alpha Spec	Iso-Th 230 Alpha Spec	Ra 226 Gamma Spec	~~VOC 8260B~~	~~SVOC 8270C~~	~~Pest. 8081A~~	~~PCB 8082~~	~~TAL Metals~~	~~Temperature~~	No. of Containers	Observations, Comments, Special Instructions
	Soil	PVSB9507	9/20/00	0825	A/SB0037	X	X	X							1	

Relinquished by	Date	Received by	Date
Signature: Brad Richardson Printed Name: A Brad Richardson Company: SAIC	09/20/00 Time: 1630	Signature: Printed Name: Company:	Time:
Signature: Printed Name: Company:	Date: Time:	Signature: Printed Name: Company:	Date: Time:

Total Number of Containers: 1

Shipment Method: 8237 2018 7719

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500

Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031

Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100

Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550

Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600

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Date 9/20/00 Page 1 of 1

Shipment No. GEL-006

Name Brad Richardson
Address 4900 Blazer Pkwy, Dublin OH 43017
Phone Number (614) 793-7600
Project Manager Brad Richardson
Project Name Painesville FUSRAP RI/FS Invest.
Job/P.O. No.

Sampler (Signature) Brad Richardson (Printed Name) Brad Richardson

Laboratory Name General Eng. Lab
Address 2040 Savage Rd.
Charleston SC, 29417
Phone (843) 556-8171
Contact Name Valerie Davis

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Requested Parameters: Grain Size ASTM 422	Atterberg ASTM4318	Moisture ASTM2216	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	SOIL	PVSB094	9/14/00	0925	A/SB0032	X	X	X	1	8.0-10'
	SOIL	PVSB0103	9/14/00	1146	A/SB0035	X	X	X	1	8.0-10'

Relinquished by	Date	Received by	Date
Signature: Brad Richardson	9/20/00	Signature:	
Printed Name: Brad Richardson	Time: 1330	Printed Name:	Time:
Company: SAIC		Company:	

Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time:	Printed Name:	Time:
Company:		Company:	

Total Number of Containers: 2

Shipment Method: 8216-3288-3099

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

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(615) 482-9031

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(201) 599-0100

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(513) 429-6550

Columbus
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(614) 793-7600

Cincinnati
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(513) 723-2600

SAIC Science Applications International Corporation An Employee-Owned Company

Chain of Custody Record

Date 9-20-00 Page 1 of 1

Shipment No. RECRA-010

Name Brad Richardson
Address 4900 Blazer Pkwy, Dublin OH 43017
Phone Number (614) 793-7600
Project Manager B Richardson
Project Name Painesville FUSRAR RI/FS
Job/P.O. No.

Sampler (Signature) Brad Richardson (Printed Name) A Brad Richardson

Laboratory Name Recra Environmental
Address 208 Welsh Pool Rd. Lionville, PA 19341
Phone (610) 280-3000 Ext. 4286
Contact Name Judy Stone

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	VOC	SVOC	Pesticides	PCB	TAL Metals	Cyanide	Temperature	No. of Containers	Observations, Comments, Special Instructions
	Water	Coolant	9/20/00	NA	NA							X	1	Field Temp 4°C
	Water	TB0013	9/20/00	0705	NA	X							1	Trip Blank
	Soil	PVSB206	9/20/00	0825	A/SB0037	X	X	X	X	X	X		5	3 Encore/Bag
	Soil	PVSB215	9/20/00	1032	D/SB0004	X	X	X	X	X	X		5	" "
	Soil	PVSB0221	9/20/00	1455	B/SB0001	X	X	X	X	X	X		5	" "
	Soil	PVSB0218	9/20/00	1315	B/SB0002	X	X	X	X	X	X		5	" "

Relinquished by
Signature: A Brad Richardson
Printed Name: A Brad Richardson
Company: SAIC
Date 9/20/00
Time 1600

Received by
Signature
Printed Name
Company
Date
Time

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 22

Shipment Method: 8237 2018 7720

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500

Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031

Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100

Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550

Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600

Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

REMIND DRIVER OF —
- NO SMOKING
- 10 MPH SPEED LIMIT
- PROTECTIVE EQUIPMENT AND CLOTHING IF [illegible]EIR STOP LOCATION [illegible]QUIRES. INSTRUCTION ON USE.

UNIROYAL CHEMICAL CO., INC.

PAINESVILLE, OHIO 44077

Be Sure Drivers Know exactly (WHAT and WHERE) of their destination.

- No Riders or Children

PLANT PROTECTION

GATE ENTRY LOG

DAY WEDNESDAY DATE 9-20-00

Start new Log Sheet each day, staple previous 24 hour Gate Entry Log to "Visitor" and "Plant Vehicle Entry-Driver" registers and file in guard office.

Badge No.	Carrier	Time In	Time Out	Pick Up	Del.	Plant Destination	Plant Person Notified and/or Comments
	Joe Schultheis	700					
	Brad Richardson	0700					
	Pete Ferron	0700					
	Doug Haas	0700					
	Darrell Landers	0700					
	Gene Stradley	0745					
	Don Malone	0745					
	Nancy Z. Kinanis	0900	–				
	Stephen Biechi	10:00					
	Stephen M Berg	1000					
	Kevin Fink	1005					
	Jodie Johnson	10:05					
	JAN KOOL	10:05					
	Paul Spaulding	10:05					
	Michelle Barczak	10:15					
	Jim Karsten	10:15					
	Tim Byrnes	10:15					

R[illegible]ARKS:

NOTE: Private vehicles and/or Non-USA citizen persons will require special clearances.

DATE 09/21/00

DAY	S	M	T	W	Th	F	S
					X		

DAILY QUALITY CONTROL REPORT

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	33-50	51-70	71-85	86 Up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid	013	

COE PROJECT MANAGER: Steve Buechi
PROJECT: Painesville FUSRAP Focus RI/FS
JOB NUMBER: 01-0513-08-4191-900
CONTRACT NUMBER: DAHA90-94-D-0007

SUBCONTRACTORS ON SITE: Dable J Drilling (Don Malone)
(Gene Stradley)

EQUIPMENT ON SITE:
Auger Rig / Geoprobe Unit
Drillers Support Vehical

WORK PERFORMED (Including Sampling): See Task Team Activity Sheet
0700 - On Site, Calibrate PID & LEL (Recorded on M&TE sheet)
0705 - Drillers go for water 0720 - H&S Tailgate, recorded in
Field Managers Logbook)
1 - Sample from Area C - IAC-SB008
" " " SB009
ReSample from Area A - IAA-SB007
" " " " SB038

Sent Coolers to labs, Recra & Thermo-Retec

(Continuation Sheet)

PROJECT: Painesville FUSRAP Focus RI/FS

REPORT NO.: 013

JOB NO.: 01-0513-08-4191-900

DATE: 09/21/00

QUALITITY CONTROL ACTIVITIES (Including Field Calibrations)

Calibrate PID and LEL (CIG) before proceeding w/ field work at start of day. Field test equipment periodically in field as needed (per approved SAP)

HEALTH & SAFETY LEVELS AND ACTIVITIES:

Levels: Gamma Activity w/ 2×2 = 5 mrem/hour
PID = >5 ppm
LEL = 10%
O_2 = 19.5%
Health and Safety "Tailgate meeting" @0720

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

SPECIAL NOTES:

TOMORROW'S PLANNED ACTIVITIES:

Continue geoprobing and sampling 2-locations at Lonza Property

PREPARED BY: Brad Richardson

TITLE: Project/Field Manager

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/21/00 Page 1 of 4

Task Team Members:
Brad Richardson
Pete Ferron
Joe Schultheis
Doug Haas
Darrell Landers

Narrative (include time and location):

Need to call Tom Wilson (350-6374) for utility clearance on northern most Lonza sample location.
0700 - On site - Equipment Calibrated and logged on M&TE Sheet, 0720 Health and Safety Briefing (Tailgate) Recorded in Field Managers Logbook. 0720 Drillers loading up water tank. 0800 - Drillers heading over to Lonza to drill IAC-SB008; Tom Wilson walked site of SB009 w/Joe Schultheis. Steve Buechi and I walked over to proposed SB009 location and adjusted it to conform

Daily Weather Condition: A.M. Cloudy, 50's Breezy

P.M.

Recorded By: Brad Richardson (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/21/00 Page 2 of 4

Task Team Members:

See Pg 1

Narrative (include time and location):

more with Bob Tuckers location (based on Walkove Survey Data). Steve and I tape locations of IAC (Lonza) locations since buildings obstruct GPS accuracy. 0950 - Doug Haas constructed sign to be posted at drummed IDU staging area (north side of Uniroyal Property): Sign say: "CAUTION: Radiological Sto ~~Sto~~ AR Materials Storage Area; before removing contact: Brad Richardson (614-793-7600) or Steve Buechi (716-879-4287) or Chris Hallam (716-879-4171 1000 - Talk to Chris Hallam: issues include finish "roping-off" additional areas; Where IDW is stored

Daily Weather Condition: A.M. Mostly Cloudy, 50's Windy

P.M.

Recorded By: Brad Richardson (Signature) QC Checked by: (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/21/00 Page 3 of 4

Task Team Members:

See Page 1

Narrative (include time and location):

"rope-off" that area (so clear distinguish from other drums of waste)!! 1020 - Drillers back from Lonza - collected SB0009, 1030 - Rolling to recollect 0.5-1.5 sample from SB0007-IAA for only VOC's - 1110 - Asked Joe and Pete to move/replace IAA-SB0038 to Pin Flag location (150k) on top of BDE Tank South Berm embankment. 1200 - Finish collection of IAA-SB0038 Finished Intrusive Sampling - 1230 Lunch Break - Packing sample shipment containers.

Daily Weather Condition: A.M. Cloudy, 50's Windy

P.M.

Recorded By: [signature] (Signature) QC Checked by: ______ (Signature)

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Painesville FUSRAP Focused RI/FS **PROJECT NO:** 01-0513-08-4191-900

Date: (mm/dd/yy): 09/21/00 Page 4 of 4

Task Team Members:

See Pg 1

Narrative (include time and location):

to Recra and Thermo Retec. ~~Mob~~ ABR

Demobe activities begin: Stage/Label all IDW drums and rope/placard. Alpha/Beta swipes of equipment/vehicals for rad. clearance. Pack up equipment & stage for early departure tomorrow.

Daily Weather Condition: A.M.

P.M. Mostly Cloudy, 50's Windy

Recorded By: [signature] QC Checked by:

(Signature) (Signature)

SAIC Science Applications International Corporation
An Employee-Owned Company

Chain of Custody Record

Date 09/21/00 Page 1 of 1

Shipment No. RECRA-011

Name Brad Richardson
Address 4900 Blazer Pkwy, Dublin OH 43017
Phone Number (614) 793-7600
Project Manager Brad Richardson
Project Name Painesville FUSRAP RI/FS
Job/P.O. No.

Sampler (Signature) Brad Richardson (Printed Name) Brad Richardson

Laboratory Name Recra Environmental
Address 208 Welsh Pool Rd. Lionville, PA 19341
Phone (610) 280-3000 Ext. 4286
Contact Name Judy Stone

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	VOC	Temp	No. of Containers	Observations, Comments, Special Instructions
	Water	Coolant	9/21/00	NA	NA		X	1	Field Temp 4°C
	Water	TB0014	9/21/00	0727	NA	X		1	Trip Blank
	Soil	PVSB0236	9/21/00	1045	A/SB007	X		3	3 Encore / Bag Voc only
									Note: Resample of
									PVSB0019 (9/14/00)
									PID response = 0 ppm

Relinquished by
Signature: Brad Richardson
Printed Name: A Brad Richardson
Company: SAIC
Date 9/21/00
Time 1300

Received by
Signature
Printed Name
Company
Date
Time

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 5

Shipment Method: 823720187693

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
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(703) 734-2500

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(615) 482-9031

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(201) 599-0100

Dayton
1321 Research Park Drive, Dayton, OH 45432
(513) 429-6550

Columbus
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(614) 793-7600

Cincinnati
635 West 7th St., Suite 403, Cincinnati, OH 45203
(513) 723-2600

SAIC Science Applications International Corporation — An Employee-Owned Company

Chain of Custody Record

Date 09/20/00 Page 1 of 1

Shipment No. TRT-009

Name B Richardson
Address 4900 Blazer Pkwy, Dublin OH 43017
Phone Number (614) 793-7600
Project Manager B Richardson
Project Name Painesville FUSRAP RI/FS
Job/P.O. No.

Sampler (Signature) A Brad Richardson (Printed Name) A Brad Richardson

Laboratory Name Thermo-Retec
Address 601 Scarboro Rd. Oak Ridge, TN 37830
Phone (865) 481-0683 Ex 128
Contact Name Mike McDougall

Requested Parameters: Iso U 238 Alpha Spec; Iso Th 230 Alpha Spec; Ra 226 Gamma Spec

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Iso U 238 Alpha Spec	Iso Th 230 Alpha Spec	Ra 226 Gamma Spec	No. of Containers	Observations, Comments, Special Instructions
	SOIL	PVSB0109	9/19/00	1455	G/SB0001	↓	↓	↓	1	G/SB0001
	SOIL	PVSB0206	9/20/00	0825	A/SB0037				1	
ABR		PVSB0209	9/21/00	~~0825~~ 0835	A/SB0038				1	
		PVSB0200	9/19/00	1555	D/SB001				1	
		PVSB0203	9/19/00	1615	D/SB002				1	
		PVSB0212	9/20/00	0955	D/SB003				1	
		PVSB0215	9/20/00	1032	D/SB004				1	
		PVSB0221	9/20/00	1455	B/SB001				1	
		PVSB0218	9/20/00	1315	B/SB002				1	
		PVSB0224	9/20/00	1635	C/SB0006				1	
		PVSB0227	9/20/00	1735	C/SB0007				1	
		PVSB0230	9/21/00	0835	C/SB0008				1	
		PVSB0233	9/21/00	0945	C/SB0009	↓	↓	↓	1	

Relinquished by	Date / Time	Received by	Date / Time
Signature: A Brad Richardson; Printed Name: A Brad Richardson; Company: SAIC	Date: 9/21/00; Time: 1300	Signature: ; Printed Name: ; Company:	Date: ; Time:
Signature: ; Printed Name: ; Company:	Date: ; Time:	Signature: ; Printed Name: ; Company:	Date: ; Time:

Total Number of Containers: 13

Shipment Method: 8237 2018 7730

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
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4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

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Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031
Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100
Dayton 1321 Research Park Drive, Dayton, OH 45432 (513) 429-6550
Columbus 655 Metro Place South, Suite 745, Dublin, OH 43017 (614) 793-7600
Cincinnati 635 West 7th St., Suite 403, Cincinnati, OH 45203 (513) 723-2600

APPENDIX C

Field Change Request Logs

Painesville FUSRAP Site RI/FS

Field Change Control Log

Program FUSRAP Sheet 1 of ____

Project Name Painesville Contract No. DAHA90-94-D-007

FCR NO.	DATE INITIATED	STATUS	SOP. NO./WORKPLAN SECTION AFFECTED	REQUESTOR	DATE FCR APPROVED
01	9/5/00		3.0	ABR	9/6/00
02	9/6/00		3.2.1 4th Para.	ABR	9/7/00
03	9/6/00		3.1.2 Rubble Pile	ABR	9/7/00
04	9/13/00		3.1.2 Area A	ABR	9/13/00
05	9/13/00		3.1.2 West Lonza Face	ABR	9/13/00
06	9/14/00		3.1.2. Rubble Pile	ABR	9/14/00
07	9/18/00		3.1.2. Soil Investigation	ABR	9/18/00

Field Change Request (FCR)

FCR NO. 001 DATE INITIATED 9/5/00

PROJECT Painesville FUSRAP Site RI/FS

CONTRACT NO. DAHA-90-94-D-007

REQUESTOR IDENTIFICATION

NAME Brad Richardson ORGANIZATION SAIC PHONE 614 793-7600

TITLE Project / Field Manag SIGNATURE Brad Richardson

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ☒ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) 3.0

DESCRIPTION OF CHANGE: Instead of backfilling geoprobe holes w/ grout, will be ~~use b~~ using bentonite chips / hydrated. Procedure is pour bent chips down hole to fill approximately 2 foot interval and ram-rod w/ long pole and hydrate; repeat procedure to ground surface.

JUSTIFICATION: Geoprobe holes will be able to be backfill immediately after removal of downhole tools, thereby reducing risk of open hole collaspe / subsidence causing a bridge of native material. Also save time

IMPACT OF NOT IMPLEMENTING REQUEST: Using grout means alot more time involved w/ mixing; this time could cause downhole material to bridge in hole preventing grout from reaching bottom of hole.

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST: Drillers

COST ESTIMATE ($) 0 ESTIMATOR SIGNATURE Brad Richardson

PHONE 614-793-7600 DATE 9-5-00

PREVIOUS FCR AFFECTED ○ YES ☒ NO; IF YES, FCR NO. NA

CLIENT PROJECT MANAGER Steve Buechi DATE

CLIENT QA SPECIALIST Dennis Rimer Dennis Rimer DATE 9/6/00

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE) NA DATE

Field Change Request (FCR)

FCR NO. 002 DATE INITIATED 9-6-00

PROJECT Painesville FUSRAP RVFS

CONTRACT NO. DAHA90-94-D-0007

REQUESTOR IDENTIFICATION

NAME Brad Richardson ORGANIZATION SAIC PHONE 614 793-7600

TITLE Project/Field Manager SIGNATURE Brad Richardson

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ☒ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) 3.2.1 4th Paragraph.

DESCRIPTION OF CHANGE: CLARIFICATION: To the 4th Paragraph of Section 3.2.1. For determining where or what interval of soil column to collect sample if location reveals at or less than background gamma activity. "When gamma radiation detector reveals statistically identical readings, or less, to background, then the upper most interval in the soil column will be sent off for laboratory analysis".

JUSTIFICATION: The upper most intervals are most likely fill material and therefore, have the highest probability of having radionuclide contamination.

IMPACT OF NOT IMPLEMENTING REQUEST: Confusion as to where to collect sample from sample location's soil column.

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST: Drillers, Rig Geologist

COST ESTIMATE ($) 0 ESTIMATOR SIGNATURE Brad Richardson

PHONE 614-793-7600 DATE 09/06/00

PREVIOUS FCR AFFECTED ○ YES ☒ NO; IF YES, FCR NO. ______

CLIENT PROJECT MANAGER Steve Buechi DATE ______

CLIENT QA SPECIALIST Dennis Rimer DATE 9/7/2000

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE) NA DATE ______

Field Change Request (FCR)

FCR NO. 003 DATE INITIATED 9-7-00

PROJECT Painesville FUSRAP Site

CONTRACT NO. DAHA90-94-D-0007

REQUESTOR IDENTIFICATION

NAME Brad Richardson ORGANIZATION SAIC PHONE 614-793-7600

TITLE Project/Field Manager SIGNATURE [signature]

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ☑ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) 3.1.2 Rubble Pile.

DESCRIPTION OF CHANGE: Instead of collection two descrete soil samples from each of the Rubble Pile sample locations from (0"-6" and 5'-6') the procedure for the collection determination will follow the soil sampling protocol set forth in Section 3.2.1; i.e. the basis of sample collection is driven by Gamma detection. In addition if the Gamma detection in the pile is >2 time background to collect on additional sample from the rubble!

JUSTIFICATION: This change will make sample/collection and analysis more indicative of the focus of this RI/FS, which is the search for possible radionuclide contamination. Also does not neglect the rubble pile when able to measure the gamma in that part of the soil column

IMPACT OF NOT IMPLEMENTING REQUEST: Inconsistancy with the collection protocol in the other areas. Also, ~~does not~~ without this Field Change, sample collection would be not radiologically determined.

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST: Samplers / Rig Geologist

COST ESTIMATE ($) 0 ESTIMATOR SIGNATURE [signature]

PHONE 614-793-7600 DATE 9-7-00

PREVIOUS FCR AFFECTED ○ YES ☑ NO; IF YES, FCR NO. ____

CLIENT PROJECT MANAGER Steve Buechi DATE ____

CLIENT QA SPECIALIST Dennis Rimer [signature] DATE 9/7/2000

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE) ____ DATE ____

Field Change Request (FCR)

FCR NO. 004 DATE INITIATED 09/13/00

PROJECT Painesville FUSRAP Site

CONTRACT NO. DAHA90-94-D-007

REQUESTOR IDENTIFICATION

NAME Brad Richardson ORGANIZATION SAIC PHONE 614-793-7600

TITLE Project/Field Manager SIGNATURE Brad Richardson

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ☒ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) SAP, 3.1.2 "Area A"

DESCRIPTION OF CHANGE: Instead of collecting the four (4) sample locations marked "M" and located in the northern most section of Area A, the one "M" location on the BDE Tank berm will be replaced with another of the remaining 5 MARSSIM Locations (pre established grid) where the rig will be able to access.

JUSTIFICATION: The size of the drill rig is too ~~[illegible]~~ large to drive up the berm embankment. Moving this MARSSIMS Point to another accessible MARSSIMs point maintains the MARSSIMS approach being established. Hand Augering through the geotextile fabric is unlikely.

IMPACT OF NOT IMPLEMENTING REQUEST: Would Require a smaller rig be subcontracted to site. If using this rig to attempt to climb berm slope would be unsafe.

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST: Drillers, Rig Geologist.

COST ESTIMATE ($) 0 ESTIMATOR SIGNATURE Brad Richardson

PHONE 614-793-7600 DATE 09/13/00

PREVIOUS FCR AFFECTED ○ YES ☒ NO; IF YES, FCR NO. ____

CLIENT PROJECT MANAGER ____ DATE ____

CLIENT QA SPECIALIST [signature] DATE 9/13/2000

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE) ____ DATE ____

Area Number 1

X	Y	X	Y	X	Y
704997.29	232889.37	704988.90	232874.83	705005.68	232874.83
704997.29	232860.29	704988.90	232845.76	704980.50	232831.22
704988.90	232816.69	705005.68	232816.69	704955.33	232787.62

Doug, These are the coordinates of the 9 MARSSIM Locations predetermined. 3 of the 4 northern most locations have been drilled. The one on the NE corner of the BDE Tank is inaccessible to the rig. Please check out the remaining five locations to see which one is most accessible to the rig, and flag it.

Brad.

Field Change Request (FCR)

FCR NO. 005 DATE INITIATED 09/13/00

PROJECT Painesville FUSRAP

CONTRACT NO. DAHA 90-94-D-007

REQUESTOR IDENTIFICATION

NAME Brad Richardson ORGANIZATION SAIC PHONE 614 793-7600

TITLE Project/Field Manager SIGNATURE Brad Richardson

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ☒ Cost ☒ Scope ○ Milestone ○ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) SAP 3.1.2 West Lonza ~~Lot~~ Fence

DESCRIPTION OF CHANGE: Based on Gamma Detection Scan along West Lonza Fence prior to drilling the two (2) Lonza boring locations, elevated levels of Gamma was detected. This is immediately adjacent to Area C. Conferred with Scott Reid and Steve Bucchi - determined to grab bias samples at points of Gamma activity >100 kcpm. Samples will provide information of constituents causing elevated Gamma activity. See Attached Map.

JUSTIFICATION: HPs noticed slag material in proximity of elevated Gamma. The analysis should indicate whether or not gamma emitting constituents are MED/AEC related or not.

IMPACT OF NOT IMPLEMENTING REQUEST: See above

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST: Sampling Team.

COST ESTIMATE ($)________ ESTIMATOR SIGNATURE________

PHONE________ DATE________

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO.________

CLIENT PROJECT MANAGER Steve Bucchi (over phone) DATE 09/13/00

CLIENT QA SPECIALIST________ DATE________

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)________ DATE________

FCR-005

SAIC/EEMG

HP-405, REV.0
Attachment 1

SAIC

RADIOLOGICAL SURVEY REPORT (Map)

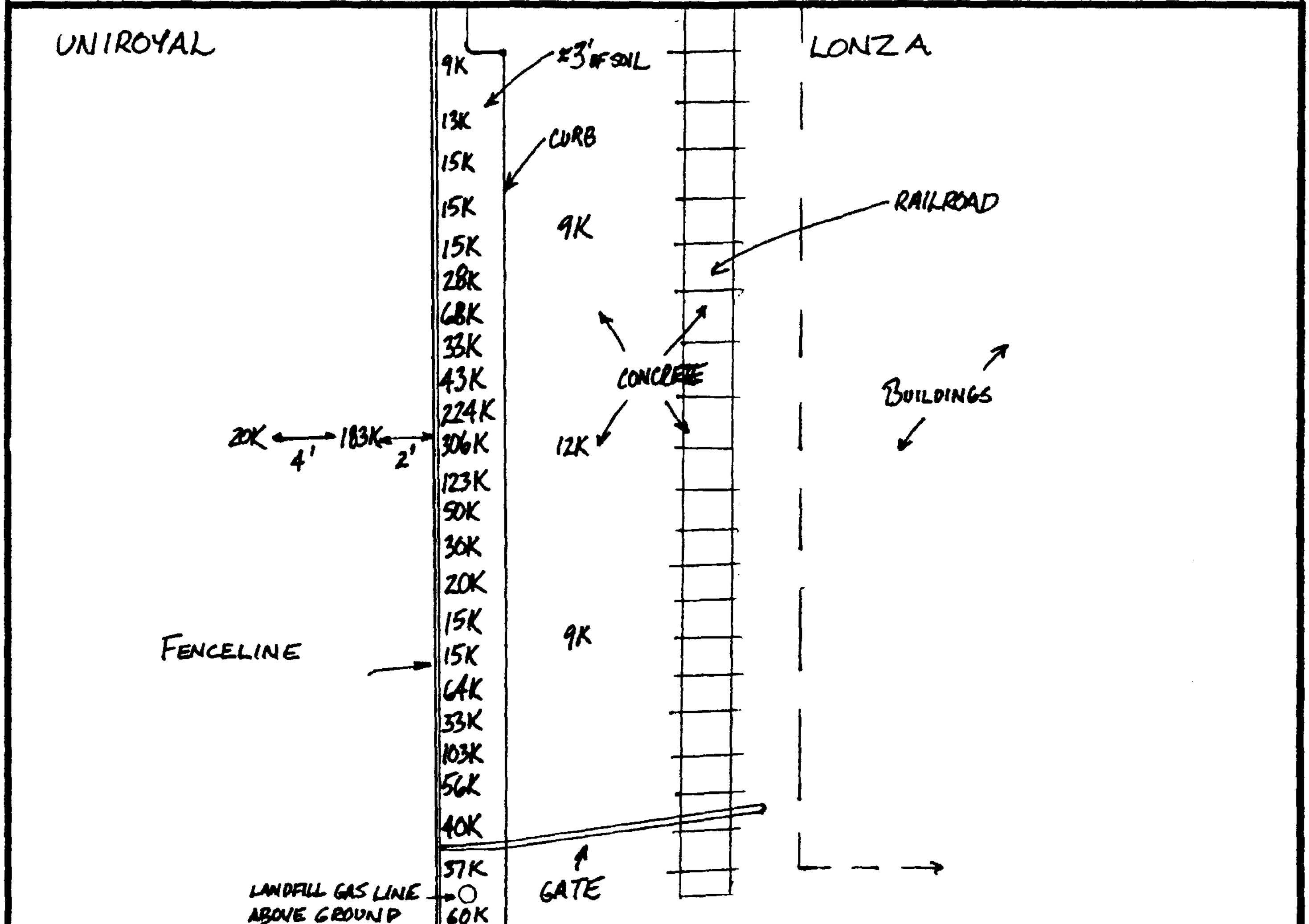
Painesville FUSRAP Site (Painesville, OH)

Page 1 of 1

SURVEY LOCATION: At Lonza Fence

DATE: 9/13/2000	TIME: 1030	HSWP No: N/A

LEGEND: See below. N/A 2"×2" meter 163694/169436, cal due 5-12-01



REMARKS:

ALL READINGS ARE CONTACT WITH SOIL WITHIN 6" OF FENCE.

ALL READINGS SOUTH OF AREA ON DIAGRAM ARE GENERALLY 7K-10K, EXCEPT BY GAS LINE.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-13-2000 /

REVIEWER SIGNATURE/DATE: /

Field Change Request (FCR)

FCR NO. 06 DATE INITIATED 09/14/00

PROJECT Painesville FUSRAP RI/FS

CONTRACT NO. DAHA-90-94-D-007

REQUESTOR IDENTIFICATION

NAME Brad Richardson ORGANIZATION SAIC PHONE 614-793-7600

TITLE Project/Field Manager SIGNATURE Brad Richardson

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ☒ Cost ☒ Scope ○ Milestone ○ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) 3.1.2 Rubble Pile & FCR No. 03

DESCRIPTION OF CHANGE: Since unable to drill random sample locations w/in the Rubble Pile, we will collect 3 descrete and biased (based on Gamma Dectection NaI 2x2) samples from the interior of the rubble pile. Following the DOE Map, indicating an SOR >1 on eastern third of pile, will concentrate our efforts there. See Attached

JUSTIFICATION: Further into rubble pile interior will help to characterize radiological contaminants.

IMPACT OF NOT IMPLEMENTING REQUEST: No samples taken from the interior of the pile (laterally) produces a haphazard bias for the perimeter investigation.

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST: HP's, Samplers.

COST ESTIMATE ($) 900.00 ESTIMATOR SIGNATURE Brad Richardson

PHONE 614-793-7600 DATE 09/14/00

PREVIOUS FCR AFFECTED ☒ YES ○ NO; IF YES, FCR NO. 003

CLIENT PROJECT MANAGER ________ DATE ________

CLIENT QA SPECIALIST [signature] DATE 9/14/2000

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE) ________ DATE ________

FCR-06

FACSIMILE TRANSMITTAL HEADER SHEET					
COMMAND/OFFICE		NAME/OFFICE SYMBOL		OFFICE TELEPHONE NO. (AUTOVON/COMM.)	FAX NO. (AUTOVON/COMM.)
FROM: Stephen P. Buechi		CELRB-PE-EE		(716)879-4287	(716)879-4355
TO: Brad Richardson		SAIC - Field		(440) 357-2029	(440) 357-2080
CLASSIFICATION	PRECEDENCE	NO. PAGES (including this header)	TIME	DATE-MONTH-YEAR	RELEASER'S SIGNATURE
		5	11:39 AM	14-Sep-00	

REMARKS:

Brad,

Here's the information I told you about regarding DOE's past characterization of the Rubble Pile in the Southeast corner of the Painesville Site. I'll keep looking to see if I can find any more info. Call me if you have any questions.

Steve B.

U. S. ARMY CORPS OF ENGINEERS
ESSAYONS
BUFFALO 1857 DISTRICT

FUSRAP

FCR-06

CCN 148789 - 01

FUSRAP COMMUNICATIONS DISTRIBUTION
DOE/ORO FORMER SITES RESTORATION DIV (EW-93)
DATE PROCESSED BY FDCC 12/10/96

FSRD Y COMM TYPE 2TX
COMM REF 96-540
ADMIN RCD

SUBJECT PNV-CHARACTERIZATION ACTIVITIES CONDUCTED AT RUBBLE PILE SE CORNE

FROM ADLER, D TO KENNEY COMM DATE 12/05/96

ADDR CODE

CLOSES CCN 148675-01 WBS 112 SUBJECT CODE 2690

AFFECTED DOCUMENT C 148675 .

TRACS. -

RESPONSE TRACKING INFO

PRIMARY
OWED TO ORG OWED BY ORG
TARGET DT CLOSING CCN - COMP DT CLOSING REF

SECONDARY
OWED TO ORG OWED BY ORG
TARGET DT CLOSING CCN - COMP DT CLOSING REF

FSRD		WA	W/O
ACTING DIRECTOR	W. Seay		1
FSRD CHRON FILE		1	
FSRD NOTEBOOKS			
READING FILE		1	
DOE			
DOE/FSCD	R. [illegible]		
DOE/OD	A. Johnson		
DOE/REAL ESTATE	C. [illegible]		
DOE/LEGAL	R. [illegible]		
ANL	B. [illegible]		
	D. [illegible]		
SAIC			
PROGRAM MANAGER	B. [illegible]		
DEPUTY PROGRAM MGR	G. [illegible]		
MGMT. SYSTEMS	K. [illegible]		
SECRETARY	S. [illegible]		

	WA	W/O		WA	W/O
D Adler	1		R. Kin		
S Amin	1		J Kapeins		
S. Cange			L Mary		
J. Darby			M Hoe		
Z. Green			S Oldham		
J Hart			T Peterson		
G Hartman			D Gass		
K. Hauser			S Williams		
J Jury					

SITES:	WA	W/O		WA	W/O
108 DUP			128 MIS		
112 PNV			138 CIS		
116 BLD			140 HIS		
119 MSP			144 NBS		
127 VEW			153 BLP		
129 LIN			156 NFS		
134 SWP			PIO-MIS		
137 WAS			PIO-TON		
OHRL					
ORISE					
SECI					
OTHERS					
D Miller				1	
W Johnson				1	
L Brede				1	
K Thompson				1	

BNI		WA	W/O
PROGRAM MANAGER	A. Sese		
DEPUTY PROGRAM MGR	W. Fyfe		
PROGRAM INT. MGR.	B. Dover		
PROJ MGRS.	M. [illegible]		
	[illegible]	1	
	J. Orlie		
COMMUNITY RELATIONS			
CONSTRUCTION			
ENGINEERING & TECHNOLOGY			
PROG. GUIDANCE & ASSESSMENT			
HEALTH & SAFETY			
ENVIR COMPLIANCE			
QUALITY ASSURANCE			
WASTE MGMT			
WASTE TREATMENT			
PROCUREMENT			
PROJECT ADMINISTRATION			
INFORMATION TECHNOLOGY			
PROJECT CONTROLS			
TECHNICAL REPORTS			
CENTRAL TOOLS & EQUIPMENT			
ADMIN RCD/INFO REPOSITORY			
INF [illegible] CHRON FILE		1	

14.10 0618.2

PLEASE RETURN TO FDCC FOR CORRECTIONS

148789

Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831— 8723

540

FCR-06

December 5, 1996

Mr. Ray Kenney
Plant Engineer
Uniroyal Chemical Company
720 Fairport-Nursery Road
Painesville, Ohio 44077

Dear Mr. Kenney:

CHARACTERIZATION ACTIVITIES CONDUCTED AT THE RUBBLE PILE IN THE SOUTHEAST CORNER OF THE UNIROYAL CHEMICAL COMPANY PROPERTY

The Department of Energy (DOE) has completed characterization activities for the rubble pile located in the southeast corner of the Uniroyal Chemical Company (UCC) property in Painesville, Ohio. Comprehensive gamma-radiation walkover surveys and soil sampling at four locations in this area have been conducted.

Based on these characterization efforts, contaminated soil was found on the eastern portion of the pile location, as identified on Enclosure 1. The eastern portion of the pile should remain on-site until DOE remobilizes for remedial action.

No radiological constituents were identified in the western portion of the pile above release guidelines set forth in DOE Order 5400.5. These guidelines have been determined by DOE to be protective of human health and the environment. Therefore, we see no need to restrict UCC's plans to remove the western portion of the pile as identified in Enclosure 2. We feel this work would not involve contacting known radiological contamination in excess of DOE guidelines.

We greatly appreciate your cooperation during our characterization effort. If you need additional guidance or have any concerns or questions regarding characterization results, please contact me at (423) 576-9634.

Sincerely,

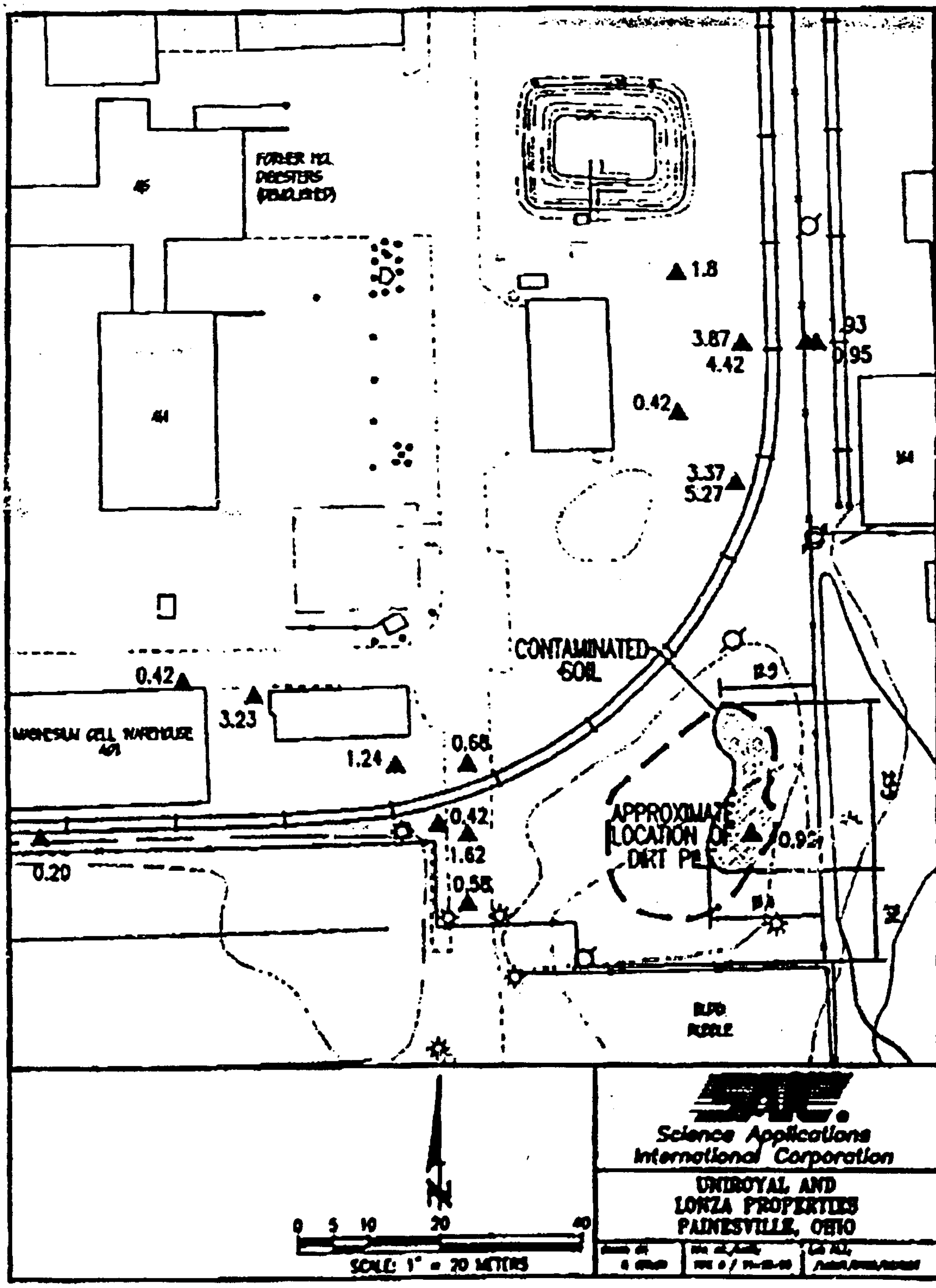
for David G. Adler, Site Manager
Former Sites Restoration Division

Enclosures

FCR-06

148789

ATTACHMENT 1

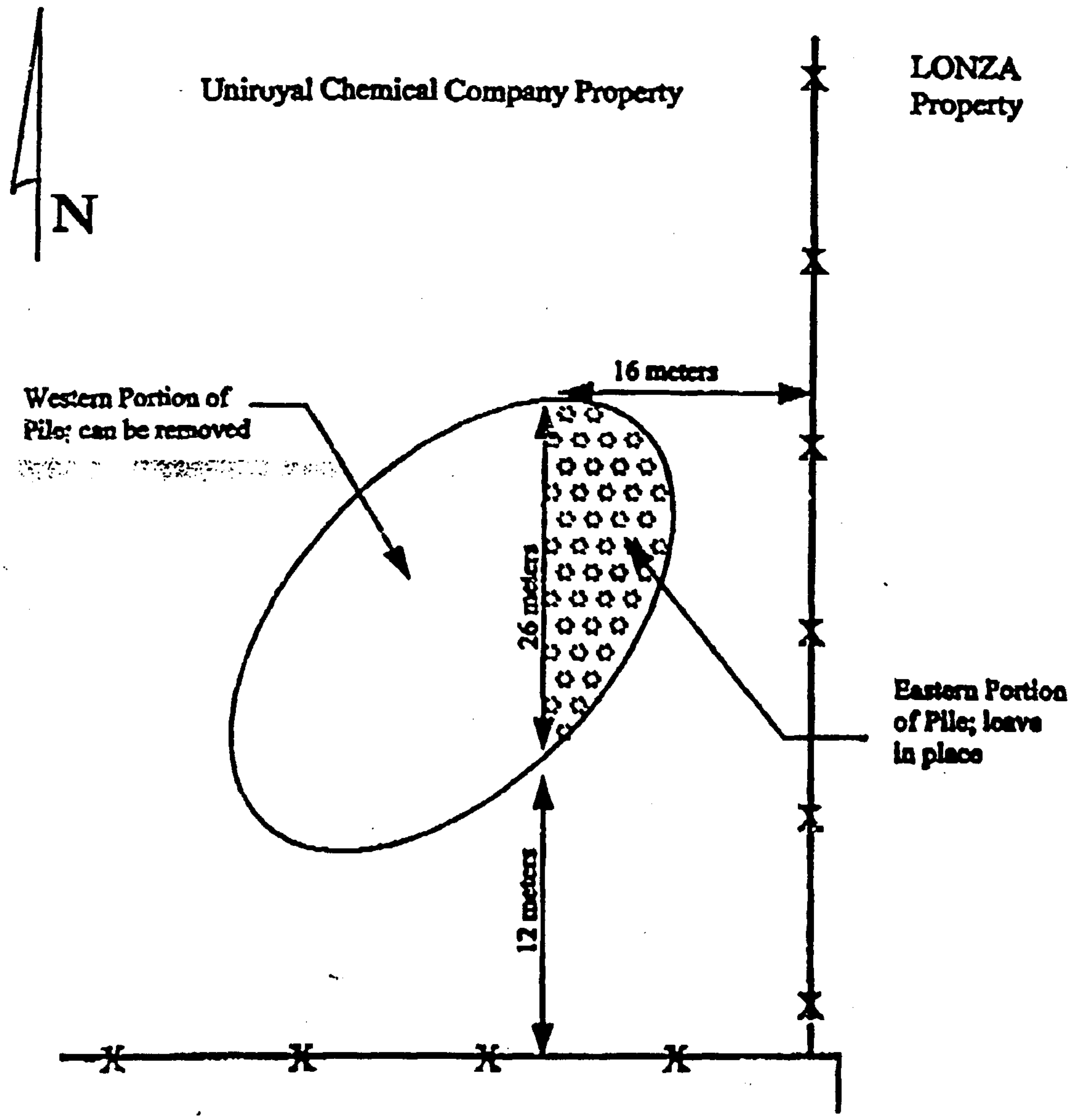


DIRT PILE LOCATION WITH SUM OF RATIOS

148789

ATTACHMENT 2

FCR-06



Field Change Request (FCR)

FCR NO. 07 DATE INITIATED 09/18/00

PROJECT Painesville FUSRAP RI/FS

Page 1

CONTRACT NO. DAHA90-94-D-007

REQUESTOR IDENTIFICATION

NAME Brad Richardson ORGANIZATION SAIC PHONE 614-793-7600

TITLE Project/Field Manager SIGNATURE Brad Richardson

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ☒ Cost ☒ Scope ○ Milestone ○ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) 3.1.2 Soils Investigation

DESCRIPTION OF CHANGE: Expansion of Areas to Investigate based on Gamma Walkover Survey Results (Conducted week of Aug 31). At areas showing elevated Gamma on this survey, previously unknown, shall be investigated with two goals in mind: 1) to confirm (or not) the radionuclide contamination in the soil by sample analysis and 2) to bound those areas with additional samples if those areas have not already been bound by previous investigations. The additional sample locations are shown on the attachment.

JUSTIFICATION: The data gathered by the recent Gamma Walkover Survey should be confirmed during this field effort, if those areas identified have not already been sampled/confirmed. Also, while currently in the field, should bound those areas with samples.

IMPACT OF NOT IMPLEMENTING REQUEST: The levels revealed in this latest Gamma Walkover Survey may possibly trigger another investigate (additional Mobe, ect).

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST: Entire field Team.

COST ESTIMATE ($)______ ESTIMATOR SIGNATURE______

PHONE 614-793-7600 DATE______

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO. ______

CLIENT PROJECT MANAGER Steve Buechi (Over phone) DATE 9/18/00

CLIENT QA SPECIALIST ______ DATE ______

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)______ DATE ______

09/18/00

FCR No. 07
Painesville FUSRAP RI/FS
DAHA90-94-D-007

Procedure: Areas identified as having gamma levels greater than 2 times background during the Aug-Sept 2000 Gamma Walkover survey will have a confirmatory sample location placed within the areas (except for a few exceptions). If the confirmatory sample soil column reveals an significantly higher gamma activity (+2000 cpm) than the background at depths greater than 1 meter, the bounding sample locations will be place in direction(s) around said area to appropriately delineate the areal extent. If the confirmatory sample soil column reveals that the uppermost 1 meter of the soil column contains the zone of significant or less than significant gamma activity (and deeper than 1 meter has less than significant gamma activity) than no bounding sample location are necessary. The gamma walkover survey data will be considered ~~to~~ sufficient to properly bound the areas.

Additional Gamma Walkover data needs to be collected in the SE and NE portion of Area A. Immediately to the South of Area F will be reinvestigated with ~~e~~ the Na I 2x2.

The minumum number of samples, before the additional Gamma Walkover Survey results are processed, are as follows.

09/18/00

FCR No. 07

Pg. 3

Area A - ~~3~~ 2 sample locations (confirmatory)
Area B - 0 " " "
Area C - 4 "bounding" sample locations - this area is on Lonza property. These bounding samples will be placed east of fence through the concrete to determine if the concrete is shielding any gamma.
Area D - 3 sample Locations (confirmatory)
Area E - 0 "
Area F - 0 "
Area G - 1 " " "
Area H - 0 "
Area I - 0 " "

APPENDIX D

Health Physics Logs and Records

Painesville FUSRAP Site RI/FS

57811

TMA
Thermo Analytical

TMA/Eberline Albuquerque Laboratory
7021 Pan American Hwy. NE
Albuquerque, NM 87109
(505) 345-3461 • FAX # (505) 761-6416

QA/QC REVIEWED
Date 9/20/95 Initials [illegible]

CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# S-03041
P.O.# OR3398

Description of Standard:

Model No. DNS-11sc Serial No. 1294/92 Isotope Thorium-230

Electroplated on polished Nickel disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2 pi alpha emission rate was measured using an internal gas flow proportional chamber. Absolute counting of alpha particles emitted in the hemisphere above the active surface was verified by counting above, below and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated alpha source S/N 2393/91.

Measurement Result:

The observed alpha particles emitted from the surface of the disc per minute (cpm) on the calibration date was

1,870 ± 56

The total disintegration rate (dpm) assuming 1.5% backscatter of alpha particles from the surface of the disc, was

3,740 ± 112 (0.00168 µCi)

The uncertainty of the measurement is 3 % which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: Arlene Gutierrez Reviewed by: Charles Lawdon

Calibration technician: [signature] Q.A. Representative: Kathy Burnham

Calibration date: 9/05/95 Reviewed date: 9-12-95

3740 dpm / 2.220 E6 = 0.00168 µCi

TMA
Thermo Analytical Inc.

S 7993

QA/QC REVIEWED
Date 11/29/93 Initials [illegible]

TMA/Eberline Albuquerque Laboratory
7021 Pan American Hwy. NE
Albuquerque, NM 87109
(505) 345-3461 • FAX # (505) 761-5416

CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# S-02751
P.O.# 0294VH

Description of Standard:

Model No. DNS-14sp Serial No. S2786 Isotope StrontiumYttrium-90

Electroplated on polished Nickel disc. 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2 pi beta emission rate was measured using an internal gas flow proportional chamber. Absolute counting of beta particles emitted in the hemisphere above the active surface was verified by counting above, below and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated beta source S/N 2148/90 .

Measurement Result:

The observed beta count rate from the surface of the disc per minute (cpm) on the calibration date was

14,900 ± 446

The total disintegration rate (dpm) assuming 40 % backscatter of beta particles from the surface of the disc, was

21,300 ± 638 (0.00958 μCi)

The uncertainty of the measurement is 3 % which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: Arlene Gutierrez Reviewed by: Charles Lamlom

Calibration technician: Arlene Gutierrez Q.A. Representative: Kathy Bunham

Calibration date: 11/22/93 Reviewed date: 11-23-93

DETERMINATION OF 2929 MDC FOR OCCUPATIONAL AIR SAMPLES AT PAINESVILLE, OH

DAC VALUE (WEIGHTED, SEE SSHP APPENDIX H) : $1E^{-11}$ μCi/ml

BKG. COUNT TIME : 10 MINUTES

SAMPLE COUNT TIME: 10 MINUTES

α BACKGROUND : 0.3 CPM

MIN. EXPECTED VOLUME : 480 L (2 LPM x 4 HRS)

FILTER EFFICIENCY : .99

2929 TH230 α EFFICIENCY : .367 c/d

$L_D = 3 + 4.65\sqrt{B}$ (MARSSIM 6-6)

$L_D = 3 + (4.65)(1.73)$

L_D = 11.1 COUNTS

L_D = 1.1 CPM

~~1.1 cpm / 2.2e6 = 4.9e-7 μCi~~

~~4.9e-7 μCi/4.8e5 ml = 1.0e-12 μCi/ml DAC~~

1.1 cpm / .363 TOTAL EFF = 3.0 DPM

3.0 DPM / $2.2E^{6}$ = $1.36E^{-6}$ μCi

$1.36E^{-6}$ μCi / $4.8E^{5}$ ml = $2.8E^{-12}$ μCi/ml

$2.8E^{-12}$ μCi/ml ÷ $1E^{-11}$ = 0.28 DAC

[signature] 9-7-2000

[signature] 9-7-2000

METER: (RICAR) 143878 / 147628

Initial 2929 Instrument Check In

Meter Number:	143878	Detector Number:	147628
Meter Model:	2929	Detector Model:	43-10-1
Cal. Due:	10/7/2000	Cal. Due:	10/7/2000
Alpha Source Type/#:	Th-230/ 1294/92	Beta Source Type/#:	Sr-Y/ 90, S2786
Source DPM:	3740	Source DPM:	19595

ALPHA	Source GCPM	BKG CPM				
ALPHA	1381	0	Average Bkg. (CPM):	0		
ALPHA	1358	2	Average Source (GCPM):	1374		
ALPHA	1397	0	Average Net Source (NCPM):	1374		
ALPHA	1430	0	Source Range (GCPM):	1237	to	1511
ALPHA	1362	0	Background Range (CPM):	-1.725	to	2.325
ALPHA	1387	0	Determined Efficiency:	36.7%		
ALPHA	1400	0				
ALPHA	1356	1	1 Standard Deviation of Bkg.	0.67		
ALPHA	1316	0	3 Standard Deviations of Bkg.	2.02		
ALPHA	1353	0				

BETA	Source GCPM	BKG CPM				
BETA	8579	63	Average Bkg. (CPM):	64		
BETA	8600	69	Average Source (GCPM):	8550		
BETA	8438	66	Average Net Source (NCPM):	8486		
BETA	8468	70	Source Range (GCPM):	7695	to	9405
BETA	8539	66	Background Range (CPM):	38.530	to	90.070
BETA	8534	77	Determined Efficiency:	43.3%		
BETA	8652	63				
BETA	8517	52	1 Standard Deviation of Bkg.	8.59		
BETA	8608	48	3 Standard Deviations of Bkg.	25.77		
BETA	8568	69				

Performed By: [signature] for Tom Jenkins Date: 9-6-2000

Reviewed By: [signature] Date: 9-6-2000

COPY

SAFETY AND ECOLOGY CORPORATION

CALIBRATION CERTIFICATE AND DATA SHEET FOR LUDLUM L- 2929

SECTION 1:	GENERAL INFORMATION	
DATE: Oct. 07, 1999	LOCATION: SEC INSTRUMENT LAB	TECHNICIAN: Jim Robinson
SERIAL #: 143878		DATE LAST CAL. EXPIRES: 12/01/99
REASON FOR CALIBRATION: ___ Due For Calibration ___ Repair (See Remarks) X Other (See Remarks)		
EQUIPMENT USED:		
TYPE:	IDENTIFICATION:	DATE DUE FOR CAL.:
L-500	87591	03/03/00

SECTION 2:	AS FOUND / AS LEFT DATA		
PHYSICAL CONDITION : **SAT** / UNSAT	Mechanical Zero As Found: 0		As Left: 0
SCALER FUNCTION CHECK	AS FOUND		AS LEFT
BETA CHANNEL WINDOW (4–50 mV)	4.1 - 49.9		4.1 - 49.9
ALPHA CHANNEL WINDOW (175 mV)	175		175
ALPHA COUNTS W/PULSER @ 10,000 CPM	AS FOUND: 9996	% ERROR 0.04 %	AS LEFT: 9996
BETA COUNTS W/PULSER @ 10,000 CPM	AS FOUND: 9996	% ERROR 0.04 %	AS LEFT: 9996

HIGH VOLTAGE:	SET POINT	AS FOUND	ERROR	AS LEFT	ERROR
	500	500	0	500	0.00 %
	1000	1000	0	1000	0.00 %
	1500	1500	0	1500	0.00 %

If as found data is within 10%, the technician may n/a the Amp/Disc Board Cal. and H.V. Cal. Sections.

9-7-2000

DETERMINATION OF LUDLUM 2929/43-10-1 MDA FOR SMEARS AT PAINESVILLE, OH

ALPHA:

BKG.: 3 COUNTS/10 MINUTES (0.3 CPM)

EFF. = .363 c/d (.367 INSTR × .99 FILTER)

$L_D = 3 + 4.65\sqrt{B}$ (MARSSIM 6-6)

$L_D = 3 + (4.65)(.55) = 5.5$ CPM

$L_D = 15$ DPM (ONE MINUTE COUNT)

BETA:

BKG. = 640 COUNTS/10 MINUTES (64 CPM)

EFF. = .429 c/d (.433 INSTR. × .99 FILTER)

$L_D = 3 + 4.65\sqrt{B}$ (MARSSIM 6-6)

$L_D = 3 + (4.65)(8) = 40.2$ CPM

$L_D = 94$ DPM (ONE MINUTE COUNT)

SITE RELEASE LIMIT = 60 DPM/100 cm² ALPHA - SEE SSHP.

METER: (RICAR) 143878 / 147628

[signature] 9-7-2000 [signature] Thomas Schweitzer 9-7-2000

COPY

SAFETY AND ECOLOGY CORPORATION

CALIBRATION CERTIFICATE AND DATA SHEET FOR LUDLUM L-43-10-1 PROBE

SECTION 1:	**GENERAL INFORMATION**	
DATE: Oct. 07, 1999	LOCATION: SEC INSTRUMENT LAB	TECHNICIAN: JIM ROBINSON
SERIAL #: PR147628	DATE LAST CAL. EXPIRES: 12/01/99	
REASON FOR CALIBRATION: X Due For Calibration	___ Repair (See Remarks)	___ Other (See Remarks)

EQUIPMENT USED:

TYPE:	IDENTIFICATION:	DATE DUE FOR CAL.:
2929	143878	10/07/99

SOURCES:

ISOTOPE:	IDENTIFICATION	CURRENT ACTIVITY (DPM)	DATE OF ASSAY
Tc-99	99TC4700276	17900	03/03/99
Th-230	1292/92	21700	7/11/95
Sr-90	99SR470083	39500	03/03/99
Pu-239	99PU4700269	15500	03/03/99

SECTION 2:	**AS FOUND DATA**			
PHYSICAL CONDITION : **SAT** / UNSAT		EFF. FROM LAST CAL: α: 37.0 % TH-230 β: 20.02 % Tc-99		
H.V. SET POINT FROM LAST CAL: 850 (3.18 VERN)		CNTS. α SOURCE : α: N/A β: N/A		
CNTS. β SOURCE : α: N/A β: N/A		AS FOUND EFF.: α : N/A % β: N/A%		
BKG: α: N/A β: N/A	β to α x-talk: N/A	α to β x-talk: N/A		
IS THE AS FOUND EFFICIENCY WITHIN 20 PERCENT OF THE EFFICIENCY FROM THE LAST CAL.? YES / NO **UNKNOWN**				
REPRODUCIBILITY:	1: N/A	2. N/A	3. N/A	AVG: N/A
ARE THE INDIVIDUAL COUNTS WITHIN 10% OF THE AVERAGE? YES / NO **UNKNOWN**				
IF THE AS FOUND DATA IS WITHIN 10% OF THE LAST CALIBRATION AND THE β TO α X-TALK IS ≤1% AND THE α TO β X-TALK IS ≤10% THEN THE TECHNICIAN MAY N/A SECTION 3 AND GO DIRECTLY TO REMARKS.				

9-7-2000

SAFETY AND ECOLOGY CORPORATION

Page 2 SN: 143878

CALIBRATION CERTIFICATE AND DATA SHEET FOR LUDLUM L- 2929

REPRODUCIBILITY				
ALPHA CHANNEL	1. 1000	2. 1000	3. 1000	AVG: 1000
BETA CHANNEL	1. 1000	2. 1000	3. 1000	AVG: 1000

ARE THE INDIVIDUAL COUNTS WITHIN 10% OF THE AVERAGE? **YES** / NO

AMP/DISC BOARD CALIBRATION:	AS FOUND	AS LEFT
GAIN (25 V/V DESIRED)	N/A	N/A
B-G THS PULSE WIDTH R-6 (5 μ SEC DESIRED)	N/A	N/A
B-G WIN PULSE WIDTH R-5 (10 μ SEC DESIRED)	N/A	N/A
B-G THS ADJUSTMENT R-3 (A.F. MAY BE 0)	N/A	N/A
B-G WIN ADJUSTMENT R-2	N/A	N/A
ALPHA THS ADJUSTMENT R-4	N/A	N/A
HIGH VOLTAGE POWER SUPPLY CALIBRATION:		
1 K.V. READING (R-5 ON H.V. BOARD)	N/A	N/A
MAX. HIGH VOLTAGE (1500 +)	N/A	N/A

AUDIO RESPONSE: **SAT** / UNSAT

AC PILOT AND LIGHT: **SAT** / UNSAT

REMARKS: CALIBRATED AS PART OF MATCH SET WITH 43-10-1 S/N PR147628 WHICH WAS REPAIRED.

DATE DUE FOR NEXT CALIBRATION: 10/07/00

CALIBRATION STICKER ATTACHED? **YES** / NO

PERFORMED BY: [signature] DATE: 10/7/99

REVIEWED BY: [signature] DATE: 10/7/99

[signature] 9-7-2000

Initial 2929 (2) Instrument Check In

Meter Number:	109535	Detector Number:	119481
Meter Model:	2929	Detector Model:	43-10-1
Cal. Due:	9/11/2001	Cal. Due:	9/11/2001
Alpha Source Type/#:	Th-230/ 1294/92	Beta Source Type/#:	Sr-Y/ 90, S2786
Source DPM:	3740	Source DPM:	19595

	Source GCPM	BKG CPM				
ALPHA	1399	2	Average Bkg. (CPM):	1.5		
ALPHA	1385	1	Average Source (GCPM):	1416		
ALPHA	1376	1	Average Net Source (NCPM):	1414		
ALPHA	1428	0	Source Range (GCPM):	1274	to	1557
ALPHA	1503	4	Background Range (CPM):	-3.028	to	6.028
ALPHA	1465	4	Determined Efficiency:	37.8%		
ALPHA	1371	0				
ALPHA	1379	0	1 Standard Deviation of Bkg.	1.51		
ALPHA	1403	2	3 Standard Deviations of Bkg.	4.53		
ALPHA	1447	1				

	Source GCPM	BKG CPM				
BETA	6527	90	Average Bkg. (CPM):	92		
BETA	6628	90	Average Source (GCPM):	6590		
BETA	6639	93	Average Net Source (NCPM):	6497		
BETA	6510	93	Source Range (GCPM):	5931	to	7249
BETA	6681	84	Background Range (CPM):	68.143	to	116.657
BETA	6704	104	Determined Efficiency:	33.2%		
BETA	6530	89				
BETA	6592	87	1 Standard Deviation of Bkg.	8.09		
BETA	6531	109	3 Standard Deviations of Bkg.	24.26		
BETA	6555	85				

Performed on 9/13/00, alpha to beta 28%, beta to alpha 6%

Performed By: D. [illegible] for Tom Jennings Date: 9-13-2000

Reviewed By: [signature] Date: 9-13-2000

SAFETY AND ECOLOGY CORPORATION

CALIBRATION CERTIFICATE AND DATA SHEET FOR LUDLUM 43-10-1 PROBE

SECTION 3: **CALIBRATION DATA** Probe # PR147628

PLATEAU AND SET POINT DATA

RESPONSE DATA: | EFF. IN 2 π GEOMETRY

PRELIMINARY H.V. SET POINT FOR BETA (TC-99 EFF. APPROX. 20 %):

HIGH VOLTAGE	BETA SOURCE RESP. Tc-99			ALPHA SOURCE RESP. Pu-239			BACKGROUND (CPM)		CROSS TALK α TO β	CROSS TALK β TO α
H.V. / VERNIER	α CH.	B CH.	EFF.	α CH.	B CH.	EFF.	α CH.	B CH.		
725	0	2694	14.91%	5881	264	37.94%	0	26	4.49%	0.00%
750	1	2988	16.46%	5845	228	37.70%	1	42	3.90%	0.03%
775	0	3436	18.97%	6172	270	39.82%	0	40	4.37%	0.00%
800	0	3998	22.11%	6068	229	39.15%	0	40	3.77%	0.00%
825	0	4366	24.10%	6295	202	40.61%	0	53	3.21%	0.00%
850	0	4697	25.96%	6269	239	40.44%	1	51	3.81%	0.00%
875	0	5106	28.15%	6341	281	40.91%	0	67	4.43%	0.00%

H.V. SET POINT: 825 / Vern 322 (APPROX. β EFF. Tc-99 = 20%, α EFF. 37%, BKG ≤ 43.9 CPM, CROSSTALK α TO β ≤ 10%, β TO α CROSSTALK ≤ 1 %)

ALPHA EFF: 37.49 % (TH-230) | BETA EFF: 43.73% (SrY-90)

BACKGROUND: GROSS COUNTS ALPHA: 1 CPM: .1 GROSS COUNTS BETA: 468 CPM: 46.8

SECTION 4:

REMARKS: TC-99 gross counts= (4343.2-46.8)=4296.4 net counts = 24.00 % EFF.

DOES PROBE MEET FINAL ACCEPTANCE CRITERIA? **YES** / NO | CALIBRATION STICKER ATTACHED? **YES** / NO

DATE PROBE IS DUE FOR NEXT CALIBRATION? 10/07/00

PERFORMED BY: [signature] | REVIEWED BY: [signature] DATE: 10/7/99

[signature] 9.7.2000

DETERMINATION OF SECOND LUDLUM 2929/43-10-1 MDA FOR SMEARS AT PAINESVILLE, OH

ALPHA:

BKG. = 15 COUNTS/10 MIN (1.5 CPM)

EFF. = .378 c/d ~~100~~

L_D = $3 + 4.65\sqrt{B}$ (MARSSIM 6-6)

L_D = $3 + 4.65(1.22) = 8.7$ CPM

L_D = 23 DPM (1 MINUTE COUNT)

BETA:

BKG. = 92 CPM (SEE INST. SETUP)

EFF. = .332 c/d

L_D = $3 + 4.65\sqrt{B}$

L_D = $3 + (4.65)(9.6) = 47.6$ CPM

L_D = 143.3 DPM ≈ 144 DPM

SITE RELEASE LIMIT = 60 DPM/100cm² α - SEE SSHP

METER: (RICAR) 109535/119481

9-13-2000

9-14-2000

DETERMINATION OF SECOND 2929 MDC FOR OCCUPATIONAL AIR SAMPLES AT PAINESVILLE, OH.

WEIGHTED DAC VALUE: $1E^{-11}$ µCi/ml

BKG. COUNT TIME : 10 MINUTES

SAMPLE COUNT TIME : 10 MINUTES

α BKG : 1.5 CPM

MINIMUM EXPECTED VOL.: 480 L (2 LPM × 4 HRS)

FILTER EFF.: 0.99

Th-230 EFF.: .378 c/d

TOTAL EFF.: .374 c/d

$L_D = 3 + 4.65\sqrt{B}$

$L_D = 3 + (4.65)(3.87)$

$L_D = 21$ COUNTS

$L_D = 2.1$ CPM

$L_D = 2.1 \text{ cpm} / .374 \text{ c/d} = 5.6$ DPM

$5.6 \text{ DPM} / 2.22E^{6} \text{ dpm/}\mu\text{Ci} = 2.5E^{-6}\ \mu\text{Ci}$

$2.5E^{-6}\ \mu\text{Ci} / 480{,}000 \text{ ml} = 5.27E^{-12}\ \mu\text{Ci/ml}$

$5.7E^{-12}\ \mu\text{Ci/ml} \div 1E^{-11}\ \mu\text{Ci/ml} = 0.53$ DAC

[signature]

9-13-2000

METER: (RICAR) 109535/119481

[signature]

9-14-2000

RICAR, Inc. Page 2 SN: 109535

CALIBRATION CERTIFICATE AND DATA SHEET FOR LUDLUM MODEL 2929

REPRODUCIBILITY

ALPHA CHANNEL	1. 400	2. 400	3. 400	AVG: 400
BETA CHANNEL	1. 400	2. 400	3. 400	AVG: 400

ARE THE INDIVIDUAL COUNTS WITHIN 10% OF THE AVERAGE? YES / NO

AMP/DISC BOARD CALIBRATION:	AS FOUND	AS LEFT
GAIN (25 V/V DESIRED)	25	25
B-G THS PULSE WIDTH R-6 (5 µ SEC DESIRED)	5	5
B-G WIN PULSE WIDTH R-5 (10 µ SEC DESIRED)	10	10
B-G THS ADJUSTMENT R-3 (A.F. MAY BE 0)	0	0
B-G WIN ADJUSTMENT R-2	4.3	5.0
ALPHA THS ADJUSTMENT R-4	182	175
HIGH VOLTAGE POWER SUPPLY CALIBRATION:		
1 K.V. READING (R-5 ON H.V. BOARD)	1000	1000
MAX. HIGH VOLTAGE (1500 +)	Good	Good

AUDIO RESPONSE: SAT / UNSAT | AC PILOT AND LIGHT: SAT / UNSAT

REMARKS: Cal'ed with Model 43-10-1 S/N PR119481

DATE DUE FOR NEXT CALIBRATION: 09/11/2001 | CALIBRATION STICKER ATTACHED? YES / NO

PERFORMED BY: [signature] DATE: 9/11/00

[signature] 9-13-00

RICAR, Inc.

CALIBRATION CERTIFICATE AND DATA SHEET FOR LUDLUM MODEL- 2929

SECTION 1:	**GENERAL INFORMATION**	
DATE: 9/11/2000	LOCATION: Instrument Lab	TECHNICIAN: Jim Robinson
SERIAL #: 109535	DATE LAST CAL. EXPIRES: Unknown	
REASON FOR CALIBRATION: X Due For Calibration	Repair (See Remarks)	Other (See Remarks)

EQUIPMENT USED:

TYPE:	IDENTIFICATION:	DATE DUE FOR CAL.:
500-2	163519	07/27/2001

SECTION 2:	**AS FOUND / AS LEFT DATA**	
PHYSICAL CONDITION : SAT / UNSAT	Mechanical Zero As Found: ZERO	As Left: ZERO
SCALER FUNCTION CHECK	AS FOUND	AS LEFT
BETA CHANNEL WINDOW (4-50 mV)	4.3 - 49.2	4.0 - 50.0
ALPHA CHANNEL WINDOW (175 mV)	162	175

ALPHA COUNTS W/PULSER @ 10,000 CPM	AS FOUND: 10000	% ERROR 0%	AS LEFT: 1000 0
BETA COUNTS W/PULSER @ 10,000 CPM	AS FOUND: 10000	% ERROR 0%	AS LEFT 1000 0

HIGH VOLTAGE: 750	SET POINT	AS FOUND		ERROR	AS LEFT		ERROR
	500	496		.8 %	496	.8 %	
	1000	1000		0 %	1000	0 %	
	1500	1508		.53 %	1508	.53 %	

If as found data is within 10%, the technician may n/a the Amp/Disc Board Cal. and H.V. Cal. Sections.

Dal [signature]
9-13-00

RICAR, Inc.

CALIBRATION CERTIFICATE AND DATA SHEET FOR LUDLUM MODEL 43-10-1 PROBE

SECTION 3: **CALIBRATION DATA** Probe # PR119481

PLATEAU AND SET POINT DATA

RESPONSE DATA:	EFF. IN 4 π GEOMETRY

PRELIMINARY H.V. SET POINT FOR BETA (TC-99 EFF. APPROX. 18%):

HIGH VOLTAGE	BETA SOURCE RESP			ALPHA SOURCE RESP.			BACKGROUND (CPM)		CROSS TALK α TO β	CROSS TALK β TO α
H.V. / VERNIER	α CH.	B CH.	EFF.	α CH.	B CH.	EFF.	α CH.	B CH.		
750 / 384	0	3886	.2736	5675	432	.3879	1	82	3 %	0 %

H.V. SET POINT: 750 (APPROX β EFF 18%, α EFF 35%, BKG < 80CPM, CROSSTALK α TO β < 10%, β TO α CROSSTALK < 1%)

COUNTS FROM ALPHA SOURCE: 5675 EFF: .3879 | COUNTS FROM BETA SOURCE: 3886 EFF: .2736

BACKGROUND: GROSS COUNTS ALPHA: 50 CPM: 1 GROSS COUNTS BETA: 4210 CPM: 84.2

SECTION 4:

REMARKS: Cal'ed with Model 2929 S/N 109535

DOES PROBE MEET FINAL ACCEPTANCE CRITERIA? <u>YES</u> / NO | CALIBRATION STICKER ATTACHED? <u>YES</u> / NO

DATE PROBE IS DUE FOR NEXT CALIBRATION? 09/11/2001

PERFORMED BY: [signature] 9/11/00

[signature] 9-13-00

RICAR, Inc.

CALIBRATION CERTIFICATE AND DATA SHEET FOR LUDLUM MODEL 43-10-1 PROBE

SECTION 1: GENERAL INFORMATION

DATE: 9/11/2000 | LOCATION: Instrument Lab | TECHNICIAN: Jim Robinson

SERIAL #: PR119481 | DATE LAST CAL. EXPIRES: Unknown

REASON FOR CALIBRATION: X Due For Calibration ____ Repair (See Remarks) ____ Other (See Remarks)

EQUIPMENT USED:

TYPE:	IDENTIFICATION:	DATE DUE FOR CAL.:
Ludlum Model 2929	109535	9/11/2001

SOURCES:

ISOTOPE:	IDENTIFICATION	CURRENT ACTIVITY	DATE OF ASSAY
Tc-99	97TC4702943	13900	09/29/97
Th-230	99TH4703241	27200	10/05/99
	99PU4700679	14400	10/05/99

SECTION 2: AS FOUND DATA

PHYSICAL CONDITION: SAT / UNSAT | EFF. FROM LAST CAL: α: N/A β: N/A

H.V. SET POINT FROM LAST CAL: 750 | CNTS. α SOURCE α: 5675 β: 432

CNTS. β SOURCE: α: 0 β: 3886 | AS FOUND EFF.: α: .3879 β: .2736

BKG: α: 1 β: 82.4 | β to α x-talk: 0 % | α to β x-talk: 3%

IS THE AS FOUND EFFICIENCY WITHIN 20 PERCENT OF THE EFFICIENCY FROM THE LAST CAL.? YES / NO

REPRODUCIBILITY: 1: 4000 | 2. 4000 | 3. 4000 | AVG: 4000

ARE THE INDIVIDUAL COUNTS WITHIN 10% OF THE AVERAGE? YES / NO

IF THE AS FOUND DATA IS WITHIN 10% OF THE LAST CALIBRATION AND THE β TO α X-TALK IS ≤ 1% AND THE α TO β X-TALK IS ≤ 10% THEN THE TECHNICIAN MAY N/A SECTION 3 AND GO DIRECTLY TO REMARKS.

9-13-00

DURATEK

Bicron #1

CALIBRATION CERTIFICATE

GTS Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8335
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Ricar Inc.		Manufacturer: Bicron	
Address: 105 Lake Road, Harriman, TN 37748		Model: Micro Rem	Serial Number: B354V
Contact Name: Jim Robinson		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: 1013	Work Order Number: 005	Calibration Method: Electronic and Source	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Instrument Response: Before Calibration	Instrument Response: After Calibration	Comments	
X 1000	160	145	165	Pulser: 683	Cal Due: 01/19/01
X 1000	100	90	100	D-814: 3063	Cal Due: 01/13/01
X 1000	40	38	40	Psychron: 5546	Cal Due: 06/14/01
X 100	16	1.45	16	Temperature: 21.5°C	
X 100	10	0.9	10	Pressure: 752mmHg	
X 100	4	3.8	4	Humidity: 60%	
X 10	1.6	1.6	1.6	Geotropism: SAT	Mech. Zero: SAT
X 10	1	1	1	BAT: SAT	Condition: SAT
X 10	0.4	0.4	0.4	High Voltage: SAT	
X 1	0.16	0.145	0.16	***All readings are in Micro R/hr	
X 1	0.1	0.09	0.1	[1]Calibrated using Source: Cs-137 019702	
X 1	0.04	0.035	0.04	[2]Calibrated using Source: Cs-137 049711	
X 0.1	0.016	0.145	0.016	[3]Pulser Calibrated	
X 0.1	0.01	0.009	0.01	NOTE: Calibration performed per vendor Tech. Manual Specifications.	
X 0.1	0.004	0.0035	0.004		

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature]	I certify that the above information is correct: Reviewed By: [signature] Date: 8-17-2000
Calibration Date: 08/17/00	Calibration Due: 08/17/01

[signature] 9-7-2000

BICRON SETUP AT PAINESVILLE, OH (#1)

BICRON μR METER SN: 8354V (RICAL), CAL. DUE: 8/17/01

SOURCE: Cs 137, 8.95 μCi, 1" BUTTON, 99CS250 (RICAL)

X 10 SCALE: SOURCE PLACED AT SIDE (CONTACT) DETECTOR CENTER.
RESPONSE: 800 μR/hr
ACCEPTANCE CRITERIA = 640 - 960 μR/hr

X 1 SCALE: SOURCE 4.75" FROM METER SIDE
RESPONSE: 100 μR/hr
ACCEPTANCE CRITERIA: 80-120 μR/hr

X 0.1 SCALE: SOURCE 26" FROM METER SIDE
RESPONSE: 18 μR/hr
ACCEPTANCE CRITERIA: 15-21 μR/hr

[signature] 9-7-2000

[signature] 9-7-2000

INSTRUMENT PLACED O.O.S. ON 9-11-2000, HIGH BKG. WHEN TURNED ON > 2 HRS (70 μR IN 5 μR FIELD). NO DEFECTIVE INSTRUMENT REPORT REQUIRED. INSTRUMENT NOT USED SINCE LAST SAT, CONSERVATIVE READING. [signature] 9-11-2000

DURATEK

Bicron #2 at Painesville

CALIBRATION CERTIFICATE

GTS Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8335
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Ricar Inc.		Manufacturer: Bicron	
Address: 105 Lake Road, Harriman, TN 37748		Model: Micro Rem	Serial Number: B347V
Contact Name: Jim Robinson		Probe: N/A	Serial Number: N/A
Customer Purchase Order Number: 1013	Work Order Number: 004	Calibration Method: Electronic and Source	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Instrument Response: Before Calibration	Instrument Response: After Calibration	Comments	
X 1000	100	90	100	Pulser: 683	Cal Due: 01/19/01
X 1000	160	145	165	D-814: 3063	Cal Due: 01/13/01
X 1000	40	38	40	Psychron: 5546	Cal Due: 06/14/01
X 100	4	3.8	4	Temperature: 27.1°C	
X 100	10	9	10	Pressure: 745mmHg	
X 100	16	14.5	16	Humidity: 50%	
X 10	0.4	0.4	0.4	Geotropism: SAT	Mech. Zero: SAT
X 10	1	1	1	BAT: SAT	Condition: SAT
X 10	1.6	1.6	1.6	High Voltage: SAT	
X 1	0.04	0.04	0.04	***All readings are in Micro R/hr	
X 1	0.1	0.1	0.1	[1]Calibrated using Source: Cs-137 019702	
X 1	0.16	0.16	0.16	[2]Calibrated using Source: Cs-137 049711	
X 0.1	0.004	0.004	0.004	[3]Pulser Calibrated	
X 0.1	0.01	0.01	0.01	NOTE: Calibration performed per vendor Tech. Manual Specifications.	
X 0.1	0.016	0.016	0.016		

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: [signature]	I certify that the above information is correct: Reviewed By: [signature] Date: 8-17-2000
Calibration Date: 08/16/00	Calibration Due: 08/16/01

[signature] 9-11-00

BICRON #2 SETUP AT PAINESVILLE, OH

BICRON μR METER S.N.: B347V, CAL. DUE: 8/16/01

SOURCE: Cs-137, 8.95 μCi, 1" BUTTON, 99CS250 (RICAR)

x10 SCALE: SIDE CONTACT DETECTOR CTR.
RESPONSE: 700 μR/hr
ACCEPTANCE CRITERIA: ~~[illegible]~~ 560-840 μR/hr

x1 SCALE: SOURCE 4.75" FROM METER SIDE
RESPONSE: 90 μR/hr
ACCEPTANCE CRITERIA: 72-108 μR/hr

x0.1 SCALE: SOURCE 26" FROM METER SIDE
RESPONSE: 15 μR/hr
ACCEPTANCE CRITERIA: 12-18 μR/hr

[illegible signature]
9-11-2000

Thomas [illegible signature]
9-14-2000

RICAR, Inc.

CALIBRATION CERTIFICATE AND DATA SHEET
LOW VOLUME AIR SAMPLER

FOR SINGLE POINT CALIBRATION

SECTION 1:	**GENERAL INFORMATION**	
DATE 8/25/00	LOCATION: RICAR Instrument Lab	TECHNICIAN: Jim Robinson
MANUFACTURER: MSA	MODEL: Escort Elf	
SERIAL #: 192	DATE LAST CAL. EXPIRES: UNKNOWN	
REASON FOR CALIBRATION: X Due For Calibration	___ Repair (See Remarks)	___ Other (See Remarks)

EQUIPMENT USED:

TYPE:	IDENTIFICATION:	DATE DUE FOR CAL.:
Bios DC-1 Standard Cell	S1130	Primary Standard

FILTER HEAD AND FILTER TYPE USED: 25mm .8micron

SECTION 2:	**AS FOUND DATA/AS LEFT DATA**			
PHYSICAL CONDITION: SAT / UNSAT	PUMP SET @: 2.00 LPM	ACTUAL: 2.003 LPM		
IS THE ACTUAL READING WITHIN 20% OF THE INDICATED VOLUME ON THE AIR SAMPLER? YES / NO				
REPRODUCIBILITY:	1: 2.003	2. 2.001	3. 2.005	AVG: 2.003
REPRODUCIBILITY: IS REPRODUCIBILITY WITHIN 10% OF THE AVERAGE? YES / NO				

REMARKS:

DATE DUE FOR NEXT CALIBRATION: 8/25/01	CALIBRATION STICKER ATTACHED? YES / NO
PERFORMED BY: J Robinson 8/25/00	REVIEWED BY: DATE:

9-7-2000

RICAR, Inc.

CALIBRATION CERTIFICATE AND DATA SHEET
LOW VOLUME AIR SAMPLER

FOR SINGLE POINT CALIBRATION

SECTION 1:	**GENERAL INFORMATION**	
DATE: 8/25/00	LOCATION: RICAR Instrument Lab	TECHNICIAN: Jim Robinson
MANUFACTURER: MSA	MODEL: Escort Elf	
SERIAL #: 2077	DATE LAST CAL. EXPIRES: UNKNOWN	
REASON FOR CALIBRATION: X Due For Calibration	____ Repair (See Remarks)	____ Other (See Remarks)

EQUIPMENT USED:

TYPE:	IDENTIFICATION:	DATE DUE FOR CAL.:
Bios DC-1 Standard Cell	S1130	Primary Standard

FILTER HEAD AND FILTER TYPE USED: 25mm .8micron

SECTION 2:	**AS FOUND DATA/AS LEFT DATA**			
PHYSICAL CONDITION: SAT / UNSAT	PUMP SET @: 2 LPM	ACTUAL: 1.998 LPM		
IS THE ACTUAL READING WITHIN 20% OF THE INDICATED VOLUME ON THE AIR SAMPLER? YES / NO				
REPRODUCIBILITY:	1: 1.996	2. 1.998	3. 2.000	AVG: 1.998
REPRODUCIBILITY: IS REPRODUCIBILITY WITHIN 10% OF THE AVERAGE? YES / NO				

REMARKS:

DATE DUE FOR NEXT CALIBRATION: 8/25/01	CALIBRATION STICKER ATTACHED? YES / NO
PERFORMED BY: [signature] 8/25/00	REVIEWED BY: DATE:

[signature] 9-7-2000

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CERTIFICATE OF CALIBRATION

CUSTOMER SAIC-BERKLEY ORDER NO. 246660

Mfg. Ludlum Measurements, Inc. Model 2221 Serial No. 163894

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR169436

Cal. Date 12-May-00 Cal Due Date 12-May-01 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 34 % Alt 695.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☑ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation ☑ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 4.4 VDC

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set Comments V Input Sens. Comment mV Det. Oper. Comments V at Comment mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 498 / 500 V Ref./Inst. 2001 / 2000 V

COMMENTS:

	Peak settings	Gross Counts
High Voltage:	772v.	1150v.
Threshold dial:	642	100(10mv)
Window dial:	40	n/a
Window Position:	"IN"	"OUT"
Resolution for Cs137:	≈7.55%	n/a

Model 2221 currently set for peak settings.
High voltage set with detector connected.

Firmware: 261026

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1k	400kcpm		400
x1k	100kcpm		100
x100	40kcpm		400
x100	10kcpm		100
x10	4kcpm		400
x10	1kcpm		100
x1	400cpm		400
x1	100cpm		100

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm		40011 (0)	Log Scale	500kcpm		475K
	40kcpm		4002		50kcpm		50K
	4kcpm		400		5kcpm		5K
	400cpm		40		500cpm		550
	40cpm		4		50cpm		50

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ [illegible] ☐ E551 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☑ Other Am241 ~ 1.59 uCi

☐ m 500 S/N 141233 ☐ Oscilloscope S/N ☑ Multimeter S/N 70860061IX

Calibrated By: Elias Chavez Date 12-MAY-00

Reviewed By: [signature] Date 12-MAY-00

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 12/29/1999

☐ Passed Dielectric (Hi-Pot) and Continuity Test

[signature] 9.7.2000

Initial 2X2 Instrument Check In

Meter Number: 163694
Meter Model: 2221
Cal. Due: 5/12/2001

Detector Number: 169436
Detector Model: 44-10
Cal. Due: 5/12/2001

Source Type/#: Cesium-137, approximately 10 uCi

	Source GCPM	BKG CPM
Gamma	212792	15743
Gamma	212926	15757
Gamma	214770	15637
Gamma	213364	15681
Gamma	214067	15515
Gamma	215084	15675
Gamma	213777	15570
Gamma	214433	15590
Gamma	214139	15718
Gamma	212431	15622

Average Bkg. (CPM):	15651		
Average Source (GCPM):	213778		
Average Net Source (NCPM):	198128		
Source Range (GCPM):	171023	to	256534
Background Range (CPM):	15415	to	15886
1 Standard Deviation of Bkg.	79		
3 Standard Deviations of Bkg.	236		

Performed By: [signature] for Tom Souratrius Date: 9-6-2000

Reviewed By: [signature] Date: 9-6-2000

Initial 2X2 Instrument Check In

Meter Number: 99146 | Detector Number: 97806
Meter Model: 2221 | Detector Model: 44-10
Cal. Due: 8/25/2001 | Cal. Due: 8/25/2001

Source Type/#: Cesium-137, approximately 10 uCi

	Source GCPM	BKG CPM				
Gamma	178358	15314	Average Bkg. (CPM):	14765		
Gamma	178089	14734	Average Source (GCPM):	179539		
Gamma	178709	14705	Average Net Source (NCPM):	164774		
Gamma	179114	14882	Source Range (GCPM):	143631	to	215446
Gamma	178468	14582	Background Range (CPM):	14101	to	15430
Gamma	178373	14593				
Gamma	179215	14544				
Gamma	179262	14785	1 Standard Deviation of Bkg.	222		
Gamma	182591	14825	3 Standard Deviations of Bkg.	665		
Gamma	183207	14687				

Performed By: [signature] for Tom Schnitzius Date: 9-6-2000

Reviewed By: [signature] Date: 9-6-2000

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 44-10 Serial No. PR169436

Customer SAIC-BERKLEY Order #. 246660

Counter 2221 Serial No. 163694 Counter Input Sensitivity 10 mV

Count Time 6 SEC. Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Am241 Size 7.59 μCi	Isotope Size	Isotope Size	Isotope Size
900	589	27515			
950	672	31219			
1000	640	32175			
1050	693	32544			
1100	700	33061			
1150	682	32534			
1200	642	33118			
1250	671	32859			
1300	726	32736			
1350	718	32698			
1400	817	33572			

Signature Eliz Chaney Date ~~5-3-~~ 12-MAY-00

FORM C4A 02/23/94

• Serving The Nuclear Industry Since 1962 •

9-7-2000

ENCLOSURE 9.1

Calibration Data Sheet Model Ludlum 2221 Portable Scaler Ratemeter

Detector Model 44-10

Initials/date JAR / 08/25/00

Instrument ID 99146

Previous Calibration Data						
Source ID		Nuclide	Certification Date	Original Activity (dpm)	Decayed Activity (dpm)	% EFF
CAL	99CS2500 289	Cs-137	09/01/99	10 uCi	10 uCi	17.07%
REF	N/A	N/A	N/A	N/A	N/A	N/A

M&TE			Environmental Conditions		
DVM	Due Date: 07/27/01	ID: 8653319	Barometer	Due Date:4/01/01	ID: 682
Pulser	Due Date: 07/27/01	ID: 163519	Thermometer	Due Date:4/01/01	ID: 682
Barometric Pressure (mmHg): 743			Temperature (°F): 74		

Linearity Check & Efficiency Determination

Nuclide Cs-137 ID 99-0291	BKG CPM	Source Count Rate							Tolerance ± 20%	As Found EFF	As Left EFF
		Source Position						MEAN MSC			
		1	2	3	4	5	6				
As Found	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
As Left	5360	396K	N/A	N/A	N/A	N/A	N/A	169230	130880 - 196320	7.4%	1.74

Special Test

Geotropism Sat (x) Unsat ( )	THR As Found 35.2 As Left 10.0
BAT Sat (x) Unsat ( )	WIN As Found 10.0 As Left 30.0
Mech Zero Sat (x) Unsat ( )	LCD HV As Found 896 As Left 896
COUNT Sat (x) Unsat ( )	DVM HV As Found 900 As Left 900
HOLD Sat (x) Unsat ( )	Response Test Sat (x) Unsat ( )
LAMP Sat (x) Unsat ( )	Over Range Test Sat (x) Unsat ( )
VOL Sat (x) Unsat ( )	Precision Test Reading 1 4000
AUDIO DIVIDE Sat (x) Unsat ( )	Reading 2 4000
WIN SWITCH Sat (x) Unsat ( )	Reading 3 4000
Sensitivity Sat (x) Unsat ( )	MEAN 4000

9-7-2000

Enclosure 9.1
Calibration Data Sheet Ludlum Model 2221 Portable Scaler Ratemeter

Initials date JAR / 08/25/00 Instrument ID 99146

Scaler Ratemeter Instrument Response						
Pulser Input		±10%	Scaler		Ratemeter	
Range	Desired	Tolerance	As Found	As Left	As Found	As Left
	CPM	CPM	CPM	CPM	CPM	CPM
X1	100	90-110	100	100	100	100
	200	180-220	199	199	200	200
	400	360-440	399	399	400	400
X10	1000	900-1100	997	997	1000	1000
	2000	1800-2200	1995	1995	2000	2000
	4000	3600-4400	3992	3992	4000	4000
X100	10,000	9000-11000	9968	9968	10000	10000
	20,000	18000-22000	19955	19955	20000	20000
	40,000	36000-44000	39933	39933	40000	40000
X1k	100k	90k-110k	99683	99683	100000	100000
	200k	180k-220k	199523	199523	200000	200000
	400k	360k-440k	399315	399315	400000	400000

Logmeter Scale Linearity Check				
Input		± 20% Tolerance	As Found	As Left
LOG	400	320-480	400	400
LOG	4000	3200-4800	4000	4000
LOG	40,000	32000-48000	40000	40000
LOG	400k	320k-480k	400000	400000

Remarks ______________________

Performed By [signature] 8/25/00 Reviewed By ______________ /
Date Date

This Calibration was performed under the guidelines of ANSI N323A-1997. All Standards and Radiological Sources are traceable to NIST, unless otherwise noted.

[signature] 9-7-2000

Enclosure 9.1
Calibration Data sheet Ludlum Model 2221 Portable Scaler Ratemeter

Initials/date: JAR / 08/25/00

Detector ID: PR097806 Detector Model: 44-10

HIGH VOLTAGE	BACKGROUND CPM	SOURCE CPM
350		
400		
450		
500		
550		
600		
650		
700		
750		
800		
850		
900 - HV Set Point	5218	169230
950		
1000		
1050		
1100		
1150		
1200		
1250		
1300		
1350		
1400		
1450		
1500		

This Calibration was performed under the guidelines of ANSI N323A-1997. All Standards and Radiological Sources are traceable to NIST, unless otherwise noted.

9-7-2000

Initial Fiddler Instrument Check In

Meter Number: 161575 | Detector Number: B005V
Meter Model: 2221 | Detector Model: G-5
Cal. Due: 6/25/2001 | Cal. Due: 6/25/2001

Source Type/#: Cesium-137, approximately 10 uCi

	Source GCPM	BKG CPM				
Gamma	251519	14466	Average Bkg. (CPM):	14401		
Gamma	250855	14468	Average Source (GCPM):	250943		
Gamma	250286	14503	Average Net Source (NCPM):	236542		
Gamma	250830	14333	Source Range (GCPM):	200754	to	301132
Gamma	250778	14414	Background Range (CPM):	14197	to	14605
Gamma	251183	14280				
Gamma	251101	14391				
Gamma	250809	14408	1 Standard Deviation of Bkg.	68		
Gamma	250831	14348	3 Standard Deviations of Bkg.	204		
Gamma	251238	14397				

Performed By: [signature] for Tom Schantzaus Date: 9-7-2000

Reviewed By: [signature] Date: 9-7-2000

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CERTIFICATE OF CALIBRATION

CUSTOMER SAIC-BERKLEY ORDER NO. 246660

1. Ludlum Measurements, Inc. Model 2221 Serial No. 161575

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR168432

Cal. Date 12-May-00 Cal Due Date 12-May-01 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 34 % Alt 695.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☑ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation ☑ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 4.4 VDC
☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set Comments V Input Sens. Comment mV Det. Oper. Comments V at Comment mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 497 / 500 V Ref./Inst. 1999 / 2000 V

COMMENTS:

	Peak settings	Gross Counts
High Voltage:	799v.	1150v.
Threshold dial:	642	100(10mv)
Window dial:	40	n/a
Window Position:	"IN"	"OUT"
Resolution for Cs137:	≈9.06%	n/a

Model 2221 currently set for peak settings.
High voltage set with detector connected.

Firmware: 261026

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1k	400kcpm		400
x1k	100kcpm		100
x100	40kcpm		400
x100	10kcpm		100
x10	4kcpm		400
x10	1kcpm		100
x1	400cpm		400
x1	100cpm		100

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

Digital Readout

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
400kcpm		399910
40kcpm		40060
4kcpm		4000
400cpm		400
40cpm		40

Log Scale

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
500kcpm		450K
50kcpm		50K
5kcpm		5.2K
500cpm		500
50cpm		52

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978

State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☑ Other Am241 ~1.59 µCi

☑ m 500 S/N 141233 ☐ Oscilloscope S/N ☑ Multimeter S/N 708600611X

Calibrated By: Elia Chavez Date 12-MAY-00

Reviewed By: E.Z. Date 12-MAY-00

FORM C22A 12/29/1999

☐ Passed Dielectric (Hi-Pot) and Continuity Test

9-7-2000

Initial 43-89 Instrument Check In

Meter Number: 163738
Meter Model: 2224
Cal. Due: 6/25/2001
Source Type/#: Th-230-1294/92
Source DPM: 3740

Detector Number: 169232
Detector Model: 43-89
Cal. Due: 6/25/2001
Source Type/#: SrY-90-S2786(RICAR)
Source DPM: 19595

	Source GCPM	BKG CPM
ALPHA	562	0
ALPHA	594	0
ALPHA	619	0
ALPHA	592	0
ALPHA	594	0
ALPHA	609	0
ALPHA	565	0
ALPHA	644	0
ALPHA	582	0
ALPHA	560	0

Average Bkg. (CPM):	0		
Average Source (GCPM):	592		
Average Net Source (NCPM):	592		
Source Range (GCPM):	474	to	711
Background Range (CPM):	0.000	to	0.000
Determined Efficiency:	15.8%		
1 Standard Deviation of Bkg.	0.00		
3 Standard Deviations of Bkg.	0.00		

	Source GCPM	BKG CPM
BETA	5423	263
BETA	5359	322
BETA	5351	328
BETA	5445	295
BETA	5422	330
BETA	5314	318
BETA	5446	336
BETA	5408	331
BETA	5330	307
BETA	5228	301

Average Bkg. (CPM):	313		
Average Source (GCPM):	5373		
Average Net Source (NCPM):	5060		
Source Range (GCPM):	4298	to	6447
Background Range (CPM):	246.190	to	380.010
Determined Efficiency:	25.8%		
1 Standard Deviation of Bkg.	22.30		
3 Standard Deviations of Bkg.	66.91		

Performed By: [signature] for Tom Simmons Date: 9-10-00

Reviewed By: [signature] Date: 9-10-00

FRISKER SETUP (43-89)
PAINESVILLE, OH
9-11-2000 AT 10:30

— SEE SETUP SHEET —

α EFF. = 15%

PROBE AREA = 126 cm^2 (LUDLUM TECH MANUAL)

MINIMUM SCALE READING = 20 CPM

α BKG = Ø CPM

FRISK MINIMUM: $(<20 \text{ cpm})\left(\frac{1}{.15 \text{ c/d}}\right)\left(\frac{1}{1.26}\right) = <106 \text{ dpm}/100\text{cm}^2$ (FIXED)

9-11-2000

9-14-2000

163738/169232

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER SPECTRULITE CONSORTIUM INC ORDER NO. 249576

Mfg. Ludlum Measurements, Inc. Model 2224 Serial No. 163338

Mfg. Ludlum Measurements, Inc. Model 43-89 Serial No. PR169238

Cal. Date 25-Jun-00 Cal Due Date 25-Jun-01 Cal. Interval 1 Year Meterface 202-783

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 77 °F RH 39 % Alt 702.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☐ F/S Resp. ck ☑ Reset ck. ☑ Window Operation ☑ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 2.2 VDC

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set 625 V Input Sens. Comment mV Det. Oper. 625 V at Comment mV Threshold Dial Ratio ___ = ___ mV

☑ HV Readout (2 points) Ref./Inst. 503 / 500 V Ref./Inst. 2000 / 2000 V

COMMENTS:

```
     Firmware: 390063
Alpha Threshold: 120mv.
 Beta Threshold: 3.5mv.
    Beta Window: 30mv.
Overload set similating light leak.
```

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400kcpm		400
x1000	100kcpm		100
x100	40kcpm		400
x100	10kcpm		100
x10	4kcpm		400
x10	1kcpm		100
x1	400cpm		400
x1	100cpm		100

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm		40032 (D)	Log Scale			
	40kcpm		4003				
	4kcpm		401				
	400cpm		40				
	40cpm		4				

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ 1879 ☐ E552 ☐ E551 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N 4337 Pu239 ☑ Beta S/N 635/83 Tc99, 5030 Sr90Y90 ☐ Other

☑ m 500 S/N 94940 ☐ Oscilloscope S/N ☑ Multimeter S/N 68160950

Calibrated By: Amando [signature] Date 25 Jun 00

Reviewed By: [signature] Date 26-Jun-00

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

[signature] 9/7/00

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-89 Serial No. PR169232 Order #. 249576

Customer SPECTRULITE CONSORTIUM INC

Counter 2224 Serial No. 167738

Count Time 1 Minute

Other

Alpha Input Sensitivity 120 mV

Beta Input Sensitivity 3.5 mV

Beta Window 30 mV

Distance Source to Detector Surface

High Voltage	Background		Isotope Pu^{239} Size 15.7k dpm		Isotope Tc^{99} Size 14.3K dpm		Isotope Sr^{90}/Y^{90} Size 7201 dpm	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
625	1	124	5566	289	5	1773	1	2264
650	0	211	5943	451	4	2615	0	2877
– 675	2	290	6209	665	7	3695	1	3565
700	1	423	6257	1472	4	4964	0	4054

☐ Gas Proportional detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

☐ Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature Armand DeYoung

Date 25 Jun 00

9/7/00

FORM C48 12/09/97

FRISKER SETUP (43-5)
PAINESVILLE, OH
9-6-2000 AT 11:00

LUDLUM MODEL 3 WITH LUDLUM 43-5 PROBE
METER S.N.: ~~92650~~ DH 111409 PROBE S.N.: ~~14682~~ DH 113481
CALIBRATION DUE: 2-2-01/8-7-01

SOURCE: 2" PLATED NIST TRACEABLE Th-230 AT 3,740 dpm 4π

RESPONSE: 400 cpm AT 1/4" *

EFFICIENCY: 400 cpm/3740 dpm = 10.6% ≈ 10%

PROBE AREA: 76 cm^2 (PER TECH. MANUAL)

*MODEL 3 DOES NOT HAVE AN INTEGRATED COUNT FUNCTION

SITE α TOTAL CONTAM. LIMIT = 300 dpm/100cm^2
300 dpm/100cm^2 = 228 dpm/PROBE
228 dpm × .1 c/d = 22 cpm
MINIMUM ON SCALE: 20 cpm (263 dpm/100cm^2)

9-6-2000

9-7-2000

SAFETY AND ECOLOGY CORPORATION

CALIBRATION CERTIFICATE FOR 3 SERIAL# 111409 0000020

SECTION 1: GENERAL INFORMATION

DATE: 02/02/00 **LOCATION:** SEC Lab

TECH: J. Glenn **DATE LAST CAL EXPIRES:** 02/24/00

Reason For Calibration:
- ○ Due For Calibration
- ◉ Repair (See Remarks)
- ○ Other (See Remarks)
- ○ Due and Repair (See Remarks)

EQUIPMENT USED DURING CALIBRATION

MODEL: 500-3 **SERIAL #:** 143970 **CAL. DUE:** 02/15/00

MODEL: **SERIAL #:** **CAL DUE:**

SECTION 2: AS FOUND DATA

CONDITION: Sat

AF MECHANICAL ZERO: **AL MECHANICAL ZERO:** 0

NEW BATTERIES: ◉ Yes ○ No **BATTERY CHECK:** Sat

HV RANGE FOR M-3 ONLY 400 - 1500 VOLTS ○ N/A ◉ Sat ○ Unsat

HV	AS FOUND HV	AS LEFT HV
500 V:		
1250 V: 1000 V for 177s		
2000 V: 1500 V for 177s		

AF INPUT SENSITIVITY (mV):

AL INPUT SENSITIVITY (mV) : N/A 33 N/A

RATE METER / SCALER

SCALE	RATE CPM	AS FOUND	% ERROR	AS LEFT	% ERROR	AS FOUND	% ERROR	AS LEFT	% ERROR
x.1 or x1	100			100	0.0%				
	250			250	0.0%				
	400			400	0.0%				
x1 or x10	1000			1000	0.0%				
	2500			2500	0.0%				
	4000			4000	0.0%				
x10 or x100	10K			10K	0.0%				
	25K			25K	0.0%				
	40K			40K	0.0%				
x100 or x1000	100K			100K	0.0%				
	250K			250K	0.0%				
	400K	90	[illegible] ~~0.0%~~	400K	0.0%				

Is the As Found Data Within 20% of the Set Point?: ○ Yes ◉ No

[illegible] 9-6-2000

SAFETY AND ECOLOGY CORPORATION

SECTION 3: REPRODUCIBILITY

Serial #: 111409

x.1 or x1 Scale:	250	250	250
x1 or x10 Scale:	2500	2500	2500
x10 or x100 Scale:	25K	25K	25K
x100 or x1000 Scale:	250K	250K	250K

Are the Individual Counts Within 10% of the Average?: ◉ **Yes** ○ **No**

Fast / Slow Response Switch Functions Properly?: ◉ **Yes** ○ **No**

Audio Response: ◉ **Sat** ○ **Unsat**

SECTION 4: FINAL ACCEPTANCE

Remarks: Replaced bad meter movement.

Does Instrument Meet Final Acceptance Criteria?: ◉ Yes ○ No

Calibration Sticker Attached?: ◉ Yes ○ No

Date Instrument is Due For Next Calibration: **02/02/01**

Performed by: Joanne Glenn **Reviewed by:** Shane Day **Date:** 2/2/00

Entered in Computer Inventory By: Joanne Glenn Date: 2-2-00

9-6-2000

SAFETY AND ECOLOGY CORPORATION

CALIBRATION CERTIFICATE FOR 43-5 PROBE # Pr113481 SEC0000120

SECTION 1: GENERAL INFORMATION

DATE:	08/07/00	LOCATION:	SEC Lab
TECH:	Shane Day	DATE LAST CAL EXPIRES:	06/26/01

REASON FOR CALIBRATION:

○ Due For Calibration ○ Repair (See Remarks) ◉ Other (See Remarks) ○ Due and Repair

EQUIPMENT USED DURING CALIBRATION

MODEL:	2221	SERIAL #:	125463	CAL. DUE:	10/25/01
MODEL:		SERIAL #:		CAL. DUE:	

NIST TRACEABLE SOURCES USED

SOURCE #:	98TH470-0733	SOURCE #:	
ISOTOPE:	Th-230	ISOTOPE:	
ACTIVITY:	29,000 dpm	ACTIVITY:	
ASSAY DATE:	02/03/98	ASSAY DATE:	

SECTION 2: AS FOUND DATA:

Physical Condition: SAT Efficiency from Last Cal.: 12.76% HV From Last Cal.: 900 V

HV	Resp - Heel	Resp - Center	Resp - Toe
900 V	3590	3599	2742

Uniformity: 17.16%

Bkg. CPM: 1

AF Probe Efficiency: 11.41%

3668	3513	3129

Uniformity: 9.0%

Bkg. CPM: 4

Efficiency: 11.84%

Is the As Found Efficiency within 20% of the efficiency from the last cal.?: ◉ Yes ○ No *See Remarks

Reproducibility: 3513 3599 3525 Average: 3546

Are the individual counts within 10% of the average?: ◉ Yes ○ No

*If As Found Efficiency is within 10% of the last calibration and uniformity is <10%, the technician may N/A Section 3 and proceed to Section 4.

9-6-2000

SAFETY AND ECOLOGY CORPORATION

SECTION 3: CALIBRATION DATA

PROBE #: Pr113481

PLATEAU AND SET POINT DATA

High Voltage:	Source Response (CPM):	Background (CPM):
700	50	1
725	189	0
750	1432	1
775	2330	0
800	2984	1
850	3341	0
900	3549	1
950	3617	2
975	3638	1

HV	RESP - HEEL	RESP - CTR	RESP - TOE		
975 V	3734	3618	3559	Bkg.: 2	Uniformity: 2.14%
				Efficiency:	**12.53%**

SECTION 4: FINAL ACCEPTANCE

Remarks: Recalibrated due to low toe rosponse. Replaced Mylar , added ZnAg (Zinc) and re greased PMT.

Does Instrument Meet Final Acceptance Criteria?: ◉ Yes ○ No

Calibration Sticker Attached?: ◉ Yes ○ No

Date Instrument is Due For Next Calibration: 08/0~~8~~7/01 on 8

Performed by: Mark Cary **Reviewed by:** Joanne Glenn **Date:** 8/7/00

Entered in Computer Inventory By: Joanne Glenn Date: 8/7/00

9.6.2010

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Cs-137

ALPHA Frisker Source: 2" plated Th-230 1294/82 **BETA Frisker Source: 2" plated** Sr-y-90 99cs250

DATE: 9-21-00

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE X10:γ800		BAT./HV check	Instrument SAT	Tech. Initials
Bicron	B347V	8-16-01	N/A		X 1.0 scale γ: 80 X 0.1 scale γ: 14		SAT	SAT	[illegible]
2224/43-89	~~163738~~ 169232	~~6-25-01~~ 6-25-01	α 0	β 319 ~~γ 198~~ 9-21-00	α 583	β 5247	SAT	SAT	[illegible]
2224/43-5	~~111409~~ 113901	~~8-7-01~~ 8-7-01	α <20 ~~γ <20~~	β N/A	α 380	β N/A	SAT	SAT	[illegible]
			α 9-21-00	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221/44-10	~~99140~~ 97806	8/25/01	γ 14694		γ 171423		SAT	SAT	[illegible]
2221/44-10	~~163694~~ 169436	5/12/01	γ 15615		γ 199064		SAT	SAT	[illegible]
			γ		γ				
			γ		γ				

Bicron readings in μRem/hr, all other instruments in counts per minute.

Reviewed By: [signature] Date: 9-21-00

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Cs-137 8.95µc: 99cs250

ALPHA Frisker Source: 2" plated Th-230 1294/82 BETA Frisker Source: 2" plated Sr-90 S'2786

DATE: 9-20-00

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE X10 γ720		BAT./HV check	Instrument SAT	Tech. Initials
Bicron	B347 ✓	8-16-01	N/A NA		X 1.0 scale γ: 100 X 0.1 scale γ:		SAT	SAT	[initials]
2224/43-89	~~169738~~ 169232	~~6-25-01~~ 6-25-01	α 0	β 298	α 576	β 4983	SAT	SAT	[initials]
2224/43-5	~~111409~~ 113481	~~2-2-01~~ 8-7-01	α <20	β NA	α 380	β NA	SAT	SAT	[initials]
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221/44-10	~~99146~~ 97806	8-25-01	γ 14,700 cpm		γ 174,294 cpm		SAT	SAT	[initials]
2221/44-10	~~169694~~ 169436	~~5-12-01~~ 5-12-01	γ 15,560		γ 200,853 cpm		SAT	SAT	[initials]
			γ		γ				
			γ		γ				

Bicron readings in µRem/hr, all other instruments in counts per minute.

Reviewed By: [signature] Date: 9-21-00

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Cs-137 8.95uci 99c250

ALPHA Frisker Source: 2" plated Th-230 1294/82 **BETA Frisker Source: 2" plated** Sr-90 S'2786

DATE: ~~9-18-00~~ 9-19-00 9-19-00

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE X10-80		BAT./HV check	Instrument SAT	Tech. Initials
Bicron	B347V	8-16-01	N/A N/A		X 1.0 scale γ: 80γ X 0.1 scale γ: NA		SAT	SAT	[illegible]
2224/43-89	~~163738~~ 169237	~~6-25-01~~ 6-25-01	α 0	β 349	α 609	β 5206	SAT	SAT	[illegible]
2224/43-5	~~111409~~ 113481	~~2-2-01~~ 8-7-01	α <20	β NA	α 350	β NA	SAT	SAT	[illegible]
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221/44-10	~~99146~~ 97806	8/25/01	γ 14869		γ 172026		SAT/SAT	SAT	[illegible]
2221/44-10	~~163694~~ 169436	~~5/12/01~~ 5-12-01	γ 15555		γ 200253		SAT/SAT	SAT	[illegible]
			γ		γ				
			γ		γ				

Bicron readings in μRem/hr, all other instruments in counts per minute.

Reviewed By: [signature] **Date:** 9-21-00

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Cs-137 8.65uCi 94cs250

ALPHA Frisker Source: 2" plated Th-230 1294/82 **BETA Frisker Source: 2" plated** Sr-Y-90 S'2786

DATE: 9-18-00

TYPE	S.N.	CAL. DUE	BACKGROUND		9-18-00 SOURCE		BAT./HV check	Instrument SAT	Tech. Initials
Bicron	B347V	8-16-01	N/A N/A		X 1.0 scale γ: ~~90 x 10: 150~~ 90x10: 150; X 0.1 scale γ: ~~10~~ 13 9-18-00		SAT / SAT	SAT	[illegible]
2224 /43-89	103738 / 109232	~~6-25-01~~ 6-25-01	α 0	β 334	α 555	β N/A	SAT	SAT	[illegible]
2224/43-5	111409/ 113401	2-2-01/ 8-7-01	α <20	β N/A	α 340	β N/A	SAT/SAT	SAT	[illegible]
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221/44-10	99146/ 97806	8/25/01	γ 111336		γ 198422		SAT/SAT	SAT	[illegible]
2221/44-10	163644/ 169436	~~5/17/01~~ 5-12-01	γ ~~14~~ 9-18-00 15471		γ 170255		SAT/SAT	SAT	[illegible]
			γ		γ				
			γ		γ				

Bicron readings in μRem/hr, all other instruments in counts per minute.

Reviewed By: [signature] Date: 9-18-2000

ATTACHMENT 10

LABORATORY INSTRUMENTATION QC DATA SHEET

DATE (MO/YR): September 2000 ☑ **Alpha Eff.:** 37.8% ☑ **Beta Eff.:** 33.2%
Instrument No.: 109535/ 119481 **Source ID:** Th-230 1294/92 (RICAR) **Source ID:** Sr/Y-90 52786 (RICAR)
Operating Voltage: 750V **Source Accpt. Crit.:** 1274 - 1557 cpm **Source Accpt. Crit.:** 5931-7249 cpm
Bkgrd. Accpt. Crit.: 0-6 cpm **Bkgrd. Accpt. Crit.:** 69-116 cpm

Day	Time	Bkgrd. QC (cpm)		Source QC (cpm)		QC (Sat/Unsat)[1]	Initials	Comment
		Alpha	Beta	Alpha	Beta			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13	1300	3	109	1412	6543	SAT	[illegible]	750V
14	0700	2	110	1458	6663	SAT	[illegible]	750V
15	0700	4	108	1434	6556	SAT	[illegible]	750V
16		~~3~~	~~83~~ [illegible]					
17								
18	0745	3	83	1442	6495	SAT	[illegible]	750V
19	0715	2	103	1429	6550	SAT	[illegible]	750V
20	0700	1	85	1475	6629	SAT	[illegible]	750V
21	0700	1	98	1469	6685	SAT	[illegible]	750V
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								

1 An unsatisfactory QC check requires recording the result in the comment column and repeating the evaluation. Tag the instrument out of service and notify the HP Supervisor upon failing the QC check two times in succession.

Reviewed By: [signature] Date: 9-[illegible]-2000

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Cs-137 8.95 μCi 99cs 250

ALPHA Frisker Source: 2" plated Th-230 1294/92 **BETA Frisker Source: 2" plated** Sr-Y-90 S 2786

DATE: 9-15-00

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE		BAT./HV check	Instrument SAT	Tech. Initials
Bicron	B347V	8-16-01	N/A N/A		X 1.0 scale γ: 86 x10:750 X 0.1 scale γ: 16		SAT/SAT	SAT	[illegible]
2224/43-89	~~163738~~ 163738 / 169232	6-25-01 / 6-25-01	α 0	β N/A	α 588	β N/A	SAT/SAT	SAT/005	[illegible]
2224/43-5	111409 / 113481	2-2-01 / 8-7-01	α <20	β N/A	α 340	β N/A	SAT/SAT	SAT	[illegible]
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221/44-10	99146 / 97806	8-25-01 / 8-25-01	γ 14825		γ 169638		SAT S.2 / 907 SAT	SAT	[illegible]
2221/44-10	163694 / 169436	5-12-01 / 5-12-01	γ 15435		γ 197783		SAT S.2 / 1150 SAT	SAT	[illegible]
			γ		γ				
			γ		γ				

Bicron readings in μRem/hr, all other instruments in counts per minute.

Reviewed By: [signature] Date: 9-15-2000

ATTACHMENT 10

LABORATORY INSTRUMENTATION QC DATA SHEET

DATE (MO/YR): September / 2000 ☒ **Alpha Eff.:** 36.7% ☒ **Beta Eff.:** 43.3% *7695-9405

Instrument No.: 143878 / 147628 **Source ID:** Th-230 1294/92 **Source ID:** Sr-Y90 52786 (RICAR)

Operating Voltage: 750V **Source Accpt. Crit.:** ~~1099-1649~~ cpm 1237-1581 **Source Accpt. Crit.:** *~~39-90~~ ~~6840-10000~~

Bkgrd. Accpt. Crit.: 0-2 cpm **Bkgrd. Accpt. Crit.:** 39-90 cpm

Day	Time	Bkgrd. QC (cpm)		Source QC (ncpm)		QC (Sat/Unsat) [1]	Initials	Comment
		Alpha	Beta	Alpha	Beta			
1	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~					
2								
3				N/A				
4								
5								
6	1530	Ø	60	1249	8399	SAT	[illegible]	
7	0715	Ø	56	1380	8495	SAT	[illegible]	
8	0705	Ø	59	1436	8582	SAT	[illegible]	
9	~~0~~	~~Ø~~	~~333*~~	~~1421~~ ~~[illegible]~~				
10								
11	0700	Ø	333*	1421	*	α SAT / β UNSAT	[illegible]	*β EACH. PLACED OOS
12	0700	Ø	N/A	1396	*	α SAT	[illegible]	
13	0730	Ø	N/A	1405	*	α SAT	[illegible]	
14								
15								
16								
17								
18								
19				INSTRUMENT REMOVED FROM SERVICE				
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								

1 An unsatisfactory QC check requires recording the result in the comment column and repeating the evaluation. Tag the instrument out of service and notify the HP Supervisor upon failing the QC check two times in succession.

Reviewed By: [signature] Date: 9-14-2000

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Cs-137 8.95 µCi 99CS250

ALPHA Frisker Source: 2" plated Th-230 1294/92 **BETA Frisker Source: 2" plated** Sr/Y-90 S2786

DATE: 9/14/2000 (ALL SOURCES FROM RICAR)

TYPE	S.N.	CAL. DUE	BACKGROUND c/m		SOURCE c/m		BAT./HV check	Instrument SAT	Tech. Initials
Bicron	B347V	8-16-01	N/A		X 1.0 scale γ: 100µR X 0.1 scale γ: 14µR ×10-780 µR		SAT	SAT	DAG
Model 3/43-5	111409/115481	2-2-01/8-7-01	α <20	β N/A	α 370	β N/A	SAT	SAT	DAG
2224/43-89	163759/149232	6-25-01/6-25-01	α Ø	β 287	α 580	β 5342	SAT	SAT	DAG
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221/44-10	99146/97806	8-25-01/8-25-01	γ 14552		γ 170129		SAT	SAT	DAG
2221/44-10	163694/169436	5-12-01/5-12-01	γ 15257		γ 207493		SAT	SAT	DAG
~~2221/6-5~~ DAG NOT USED			γ		γ				
			γ		γ				

Bicron readings in µRem/hr, all other instruments in counts per minute.

Reviewed By: [signature] Date: 9-14-00

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Ricar Cs 137 8.95 µCi 99-s 250

ALPHA Frisker Source: 2" plated Th-230 1294/92 **BETA Frisker Source: 2" plated** 32786

DATE: 9-13-00

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE		BAT./HV check	Instrument SAT	Tech. Initials
BICRON	B347V	8-16-2001	N/A N/A		X 1.0 scale γ: 75 x10 :800 X 0.1 scale γ: 13		SAT	SAT	[illegible]
2224/43-89	163739/169232	6-25-01/6-25-01	α 0	β 315	α 604	β 5315	SAT	SAT	[illegible]
Model 3/43-5	111409/113481	2-2-01/8-7-01	α < 20	β N/A	α 360	β N/A	SAT	SAT	[illegible]
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221/44-10	163694/169436	5-12-01/5-12-01	γ 15463		γ 198762		1151 HV 5.4 SAT	SAT	[illegible]
2221/44-10	99146/97806	8-25-01/8-25-01	γ 14932		γ 173412		906 HV 5.1 SAT	SAT	[illegible]
			γ		γ				
			γ		γ				

Bicron readings in µRem/hr, all other instruments in counts per minute.

Reviewed By: [illegible] Date: 9-14-2000

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Ricxxx Cs-137 895 µCi 99cs 250 RL

ALPHA Frisker Source: 2" plated Th-230 1294/92 **BETA Frisker Source: 2" plated** ~~N/A~~ RL S 2786

DATE: 9-12-00

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE		BAT./HV check	Instrument SAT	Tech. Initials
Bicron	B 347 V	8-16-01	N/A N/A		X 1.0 scale γ: ~~8~~ x10 γ:800 X 0.1 scale γ: 16		SAT / SAT	SAT	RL
Model 3 / 43-5	111409 / 115481	2-2-01 / 8-7-01	α <20	β N/A	α 360	β N/A	SAT	SAT	RL
2224 / 43-89	163739 / 169232	6-25-01 / 6-25-01	α 0	β 322	α 575	β 5280	SAT	SAT	RL
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221 / 44-10	99146 / 97806	8-25-01 / 8-25-01	γ 14500		γ 174475		5.1 SAT	SAT	RL
2221 / 44-10	163694 / 169436	5-12-01 / 5-12-01	γ 15543		γ 200475		5.4 SAT	SAT	RL
2221 / 6-5	161575 / B005V	5-12-01 / 5-12-01	γ 14200		γ 253346		5.6 SAT	SAT	RL
			γ		γ				

Bicron readings in µRem/hr, all other instruments in counts per minute.

Reviewed By: [signature] Date: 9-14-2000

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Ricgue Cs-137 8.95 μCi 99cs 250 RL

ALPHA Frisker Source: 2" plated Th-230 1284/92 **BETA Frisker Source: 2" plated** N/A

DATE: 9-11-00

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE		BAT./HV check	Instrument SAT	Tech. Initials
Bicron	B354V	8-19-01	N/A		X 1.0 scale γ: 90 X10 800 X 0.1 scale γ: 18		SAT	SAT	RL
Model 3/43-5	111409/113481	2-2-01/8-7-01	α <20	β N/A	α 340	β N/A	SAT	SAT	RL
2224/43-89	163739/169222	6-25-01/6-25-01	α 0	β 326	α 617	β 5313	RL SAT	SAT	RL
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221/44-10	99146/97806	8-25-01/8-25-01	γ 14837		γ 171265		5.2/907 SAT	SAT	RL
2221/44-10	163694/169436	5-12-01/5-12-01	γ 15216		γ 196105		5.4/1150 SAT	SAT	RL
Bicron	B347V	8-16-01	γ N/A		γ x10 700 μR/hr x1 90 x.1 15		SAT	SAT	DH
			γ		γ				

Bicron readings in μRem/hr, all other instruments in counts per minute.

Reviewed By: D Haa Date: 9-14-2000

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: (Ricm) Cs-137 8.95 μCi 99CS250

ALPHA Frisker Source: 2" plated Th-230 1284/92 **BETA Frisker Source: 2" plated** N/A

DATE: 9-8-00

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE		BAT/HV check	Instrument SAT	Tech. Initials
Bicron μR	B354V	8/19/01	N/A		X 1.0 scale γ: 90 X 0.1 scale γ: 15 x10: 800		SAT	SAT	
Model 3/43-5	111409/113481	2-2-01/8-7-01	α NA	β NA	α 400cpm	β NA	SAT	SAT	
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221/44-10	163694/169436	5-12-01/5-12-01	γ 15549		γ 208142		5.4/1150 SAT	SAT	
2221/44-10	99146/97806	8-25-01/8-25-01	γ 14892		γ 180830		5.3/907 SAT	SAT	
			γ		γ				
			γ		γ				

Bicron readings in μRem/hr, all other instruments in counts per minute.

Reviewed By: Date: 9-8-2000

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: (RIOAR) Cs137 895 μC 99CS250

ALPHA Frisker Source: 2" plated Th230, 1294/92 **BETA Frisker Source: 2" plated** N/A

DATE: 9-7-00

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE		BAT./HV check	Instrument SAT	Tech. Initials
Bicron μR	B354V	8/19/01	N/A		X 1.0 scale γ: 100 X 0.1 scale γ: 18 x10: 1000		SAT	SAT	[signature]
Model 3/43-5	111409/113481	22-01/8-7-01	α ~~[illegible]~~ <20	β N/A	α 440 cpm	β N/A	SAT	SAT	[signature]
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
44-10/2221	Meter 163694 Probe 189436	Meter 5-12-01 Probe	γ 15646		γ 214444		5.5/1150 SAT	SAT	[signature]
2221/44-10	99146/97806	8-25-01/8-25-01	γ 15183		γ 185511		5.2/900 SAT	SAT	[signature]
			γ		γ				
			γ		γ				

Bicron readings in μRem/hr, all other instruments in counts per minute.

Reviewed By: [signature] Date: 9-8-00

PERFORMANCE TEST AND SOURCE TEST LOG

Location: Painesville FUSRAP site (Painesville, OH)

Bicron MicroRem and Ludlum 2221/44-10 Source: Cs-137 8.95 μC 99C5-250

ALPHA Frisker Source: 2" plated Th-230 1294/92 **BETA Frisker Source: 2" plated** N/A

DATE: 9-6-2000

TYPE	S.N.	CAL. DUE	BACKGROUND		SOURCE		BAT./HV check	Instrument SAT	Tech. Initials
			N/A		X 1.0 scale γ: X 0.1 scale γ:				
Mo… 3 / 43-5	111461 / 113481	2-2-01 / 8-7-01	α <20	β N/A	α 440 cpm	β N/A	SAT	SAT	[illegible]
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
			α	β	α	β			
2221 / 44-10	163694 / 169436	5-12-01 / 5-12-01	γ 15593		γ 209378		SAT	SAT	[illegible]
			γ		γ				
			γ		γ				
			γ		γ				

Bicron readings in μRem/hr, all other instruments in counts per minute.

Reviewed By: _______________ **Date:** 9-7-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: AREA 'A', SAMPLES, RMSA AREA

DATE: 9-21-00 | TIME: 1500

PURPOSE OF SURVEY: VERIFY RADIOLOGICAL CONDITIONS

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
Bicron Microrem	B347V	8-16-01	N/A	N/A
2929/43-10	109535/119481	9-11-01/9-11-01	1α/92β	.378/.332
		N/A		

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
2 SAMPLES	Ø	<23	4	<144				<1/<1
AREA 'I' (HIGHEST AT KNEE)			← N/A →					40
AREA 'A' AT 500K LOC. (AT KNEE)			← N/A →					20
4 SAMPLES	4	<23	Ø	<144				<1/<1
1 SAMPLE	Ø	<23	Ø	<144				80/10
COOLER (BOTTOM)	1	<23	Ø	<144		N/A		30/3
COOLER 2	Ø	<23	13	<144				<1/<1
2 IDW DRUMS (EXT)	Ø	<23	6	<144				<.01
2 IDW DRUMS (EXT)	Ø	<23	9	<144				<.01
2 IDW DRUMS (EXT)	Ø	<23	Ø	<144				<.01
2 IDW DRUMS (EXT)	Ø	<23	Ø	<144				<.01
2 IDW DRUMS (EXT)	Ø	<23	3	<144				<.01
1 DRUM/1 RINSE ACID CONTR.	4	<23	4	<144				<.01

REMARKS:

• DOSE RATES AT: CONTACT / 1 METER WHERE INDICATED.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-21-00 ______ /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC

RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: Area "A", Samples, RMSA Area

DATE: 9-21-00 | TIME: 1500 | HSWP:

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Drum Storage Area	2	<23	5	<144	NA	NA	<0.01
Drum Storage Area	0	<23	5	<144			<0.01
Drum Storage Area	0	<23	5	<144			<0.01
Drum Storage Area	3	<23	3	<144			<0.01
	N/A						

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: Darrell Land / 9-21-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Drilling / Sampling Equipment

DATE: 9-21-00 TIME: 1290

PURPOSE OF SURVEY: Jas coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
43-89	163738 / 169232	6-25-01 / 6-25-01	0α	15%
2929	109535	9/4/01	1α / 92β	~~37.8%~~ 33.2%
	N	A		

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Shovel	3	<23	12	<144	<20	<20	<106	N/A
Pipe Wrenches (3)	0	<23	2	<144	<20	<20	<106	
Post Holedigger	1	<23	3	<144	<20	<20	<106	
Drill Bits (3)	1	<23	5	<144	<20	<20	<106	
Boring Tubes (4)	1	<23	5	<144	<20	<20	<106	
Boring Tubes (4)	0	<23	0	<144	<20	<20	<106	
3-50 Gal. Barrels	0	<23	0	<144	<20	<20	<106	
Pickup Bed Front	0	<23	0	<144	<20	<20	<106	
Pickup Bed Middle	1	<23	4	<144	<20	<20	<106	
Pickup Bed Back	1	<23	13	<144	<20	<20	<106	
		N		A				

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-21-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC

RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Double "J" Geoprobe Rig Lic# M2048 - West Virginia

DATE: 9-21-00 | TIME: 1204

PURPOSE OF SURVEY: To verify that radiological conditions are within release limits

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
43-89	103738 / 169232	6/25/01 / 6/25/01	0 α	15%
2929	109535	9/11/01	1α / 92β	37.8% / 33.2%
	N A			

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Hood	0	<23	0	<144	<20	<20	<106	N/A
Front Tires	0	<23	14	<144	<20	<20	<106	
Undercarriage	1	<23	0	<144	<20	<20	<106	
Bed Front	0	<23	6	<144	<20	<20	<106	
Mud Flap	0	<23	1	<144	<20	<20	<106	
Bed Rear	0	<23	0	<144	<20	<20	<106	
Controls	2	<23	2	<144	<20	<20	<106	
Back Hydraulics	2	<23	0	<144	<20	<20	<106	
Trailer Tire	3	<23	13	<144	<20	<20	<106	
Air Filter	0	<23	0	<144	<20	<20	<106	
Rear tire	0	<23	0	<144	<20	<20	<106	
Pedal & Floor	0	<23	0	<144	<20	<20	<106	
Steering Wheel	0	<23	3	<144	<20	<20	<106	

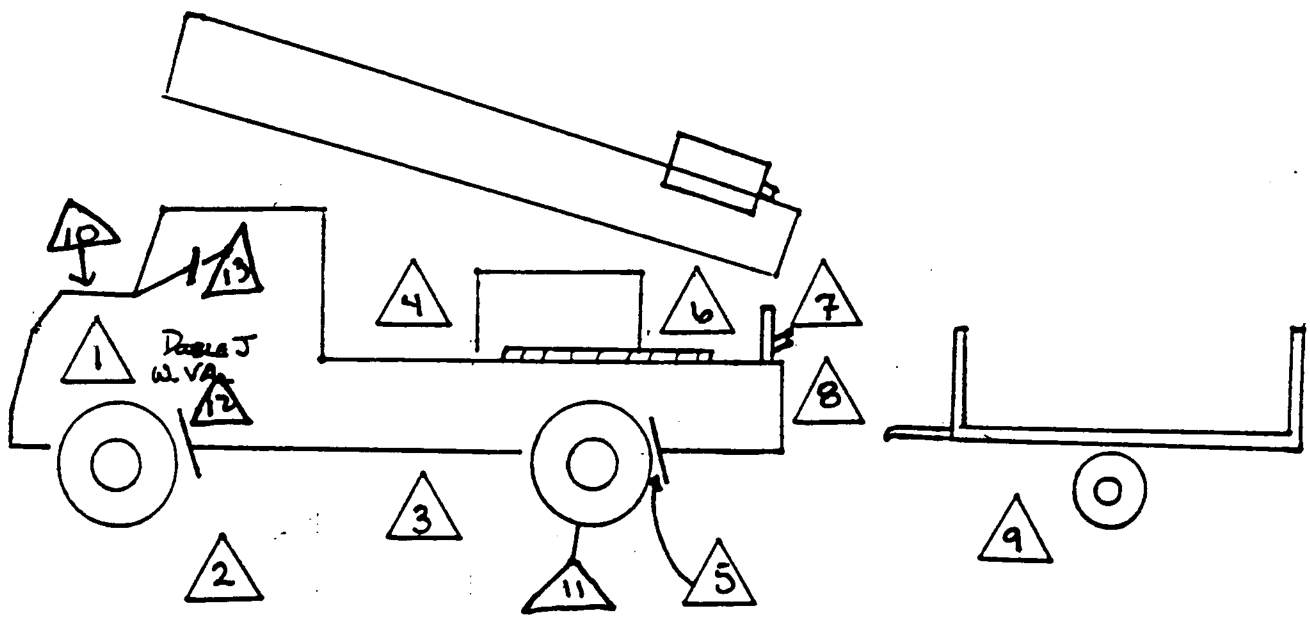
REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9.21.00 ______ / ______

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT (Map)
Painesville FUSRAP Site (Painesville, OH)

SURVEY LOCATION: Double 'J' Geoprobe Rig Lic# M2048 - West Virginia		
DATE: 9-21-00	TIME: 1204	HSWP No: N/A
LEGEND: △ = CONTAMINATION SURVEY LOCATIONS		



REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-21-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Area A & Lonza

DATE: 9-20-00 | TIME: 0630-1800

PURPOSE OF SURVEY: Drilling Coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
43-89	163738/109232	~~6-25-01~~ 6-25-01	0 α	15 %
2929	109535	9/11/01	1α/92β	~~37.8%~~ 33.2%
	N		A	

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Hand Auger	4-21-∅ ~~∅~~3	<23	51	<144	<20	<20	<106	N/A
Hand Auger	0	<23	7	<144	<20	<20	<106	
Bowl	0	<23	15	<144	<20	<20	<106	
Spoon	1	<23	29	<144	<20	<20	<106	
Shoe - Bore	0	<23	0	<144	<20	<20	<106	
Bore Tubes (3)	5	<23	10	<144	<20	<20	<106	
Shoe - Bore	0	<23	0	<144	<20	<20	<106	
Hydraulic Drill Rig	3	<23	11	<144	<20	<20	<106	
Rear Tire Drill Rig	3	<23	10	<144	<20	<20	<106	
Front Tire Drill Rig	0	<23	0	<144	<20	<20	<106	
Bore Tubes	2	<23	10	<144	<20	<20	<106	
Support Truck F. Tire	0	<23	5	<144	<20	<20	<106	
Support Truck Rear Tire	2	<23	1	<144	<20	<20	<106	

REMARKS: Friskers were used to screen equipment during intrusive work in radiation areas. Hands, faces, boots and torso were screened. Hand tools were also frisked. No α contamination above the minimum detectable limit was found on workers, tools in the course of survey

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-20-00 ______ /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: Area A & Lonza

DATE: 9-20-00 TIME: 0630-1800 HSWP:

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Support Truck Pedal & Floor	1	<23	0	<144	<20	<106	N/A
Support Truck Steering Wheel	3	<23	11	<144	<20	<106	
Support Truck Bed	2	<23	0	<144	<20	<106	
Drill Rig Hydraulics	1	<23	0	<144	<20	<106	
Drill Rig Pedal & Floor	2	<23	0	<144	<20	<106	
Drill Rig Steering wheel	0	<23	4	<144	<20	<106	
Pickup Front Tires	0	<23	25	<144	<20	<106	
Pickup Rear Tires	0	<23	21	<144	<20	<106	
Pickup Pedal & Floor	1	<23	0	<144	<20	<106	
Pickup Steering wheel	0	<23	0	<144	<20	<106	
Pickup Bed	0	<23	28	<144	<20	<106	
Plastic on table	0	<23	0	<144	<20	<106	
Bed Drill Rig	0	<23	0	<144	<20	<106	
Sampling Dishes	2	<23	1	<144	<20	<106	

NA

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: Darrell [signature] / 9-20-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: SAMPLES/COOLERS

DATE: 9-20-2000 | TIME: 1600

PURPOSE OF SURVEY: VERIFY RADIOLOGICAL CONDITIONS PRIOR TO SHIPMENT

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929/A3-10-1	109535/119481	9-11-01/9-11-01	1α/92β	.378α/.332β
BICRON MICRO R	B347V	8-16-01	N/A	N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
4 SAMPLES	2	<23	21	<144				<1/<1
5 SAMPLES	2	<23	7	<144				<1/<1
4 SAMPLES	2	<23	Ø	<144				<1/<1
3 SAMPLES	2	<23	7	<144		N/A		<1/<1
5 SAMPLES	3	<23	Ø	<144				<1/<1
COOLER 1	Ø	<23	8	<144				<1/<1
COOLER 2	1	<23	7	<144				<1/<1
SHELBY BOX	Ø	<23	Ø	<144				<1/<1

REMARKS:

- COMPOSITE SMEARS TAKEN ON SAMPLES.
- ALL DOSE RATES AT: CONTACT/1 METER.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-20-00 ______ /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: SAMPLES / COOLERS

DATE: 9-19-2000 | TIME: 1300-1800

PURPOSE OF SURVEY: VERIFY RADIOLOGICAL CONDITIONS PRIOR TO SHIPPING

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929/43-10-1	109535/119481	9-11-01/9-11-01	1α/92β⁻	.378α/.332β⁻
BICRON MICROR	B347V	8-16-01	N/A	N/A
		N/A		

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
6 SAMPLES	1	<23	20	<144				<1/<1
5 SAMPLES	1	<23	14	<144				<1/<1
5 SAMPLES	0	<23	14	<144				<1/<1
5 SAMPLES	1	<23	4	<144				<1/<1
5 SAMPLES	3	<23	13	<144				<1/<1
3 SAMPLES	2	<23	12	<144		N/A		<1/<1
5 SAMPLES	1	<23	9	<144				<1/<1
5 SAMPLES	2	<23	0	<144				<1/<1
3 SAMPLES	1	<23	7	<144				<1/<1
5 SAMPLES	3	<23	2	<144				<1/<1
7 SHELBY TUBES	2	<23	4	<144				<1/<1
COOLER #1	4	<23	24	<144				<1/<1
COOLER #2	1	<23	2	<144				<1/<1

REMARKS:
- ALL SAMPLE CONTAINER (EXTERIOR) SMEARS COMPOSITED.
- ALL DOSE RATES ARE: CONTACT/1 METER

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-20-2000 ______ /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: SAMPLES / COOLERS

DATE: 9-19-2000 | TIME: 1300-1800

PURPOSE OF SURVEY: VERIFY RADIOLOGICAL CONDITIONS PRIOR TO SHIPPING

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929/43-10-1	109535/119481	9-11-01/9-11-01	1α/92β⁻	.378α/.332β⁻
BICRON MICROR	B347V	8-16-01	N/A	N/A
		N/A		

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
6 SAMPLES	1	<23	20	<144				<1/<1
5 SAMPLES	1	<23	14	<144				<1/<1
5 SAMPLES	Ø	<23	14	<144				<1/<1
5 SAMPLES	1	<23	4	<144				<1/<1
5 SAMPLES	3	<23	13	<144				<1/<1
3 SAMPLES	2	<23	12	<144		N/A		<1/<1
5 SAMPLES	1	<23	9	<144				<1/<1
5 SAMPLES	2	<23	Ø	<144				<1/<1
3 SAMPLES	1	<23	7	<144				<1/<1
5 SAMPLES	3	<23	2	<144				<1/<1
7 SHELBY TUBES	2	<23	4	<144				<1/<1
COOLER #1	4	<23	24	<144				<1/<1
COOLER #2	1	<23	2	<144				<1/<1

REMARKS:
- ALL SAMPLE CONTAINER (EXTERIOR) SMEARS COMPOSITED.
- ALL DOSE RATES ARE: CONTACT/1 METER

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-20-2000 ____ / ____

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Painesville

DATE: 9-19-00 | TIME: 0630 - 1700

PURPOSE OF SURVEY: Drilling Coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
43-89	163738 / 169232	~~6-25-01~~ 6-25-01	0α	15%
2929	109535	9/11/01	1α / 92β	37.8% / 33.27%
N	A			

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Bore Tube(3)	0	<23	0	<144	<20	<20	<106	NA
Bore Tube(3)	3	<23	11	<144	<20	<20	<106	
Bore Tubes (4)	0	<23	0	<144	<20	<20	<106	
Drill Rig Front Tires	2	<23	23	<144	<20	<20	<106	
Drill Rig Rear Tires	3	<23	0	<144	<20	<20	<106	
Bore Tubes	1	<23	0	<144	<20	<20	<106	
Bore Tubes(2)	0	<23	0	<144	<20	<20	<106	
Drill Rig Front Tires	0	<23	5	<144	<20	<20	<106	
Drill Rig Rear Tires	1	<23	0	<144	<20	<20	<106	
Drill Rig Front Tires	3	<23	15	<144	<20	<20	<106	
Drill Rig Rear Tires	0	<23	8	<144	<20	<20	<106	
Drill Rig Hydraulics	1	<23	10	<144	<20	<20	<106	
Support Truck Steering Wheel	5	<23	14	<144	<20	<20	<106	

REMARKS: Friskers were used to screen personnel during intrusive work in intrusive areas. Hands faces boots and torso were screened. Hand tools were also frisked. No α contamination above the minimum detectable limit was found on workers or tools in the course of survey

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-19-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC

RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: Painesville

DATE: 9-19.00 | TIME: 0630-1700 | HSWP:

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Support Truck Pedal Floor	0	<23	12	<144	<20	<106	NA
Support Truck Front Tire	2	<23	11	<144	<20	<106	
Support Truck Rear Tire	0	<23	0	<144	<20	<106	
Support Truck bed rear	0	<23	0	<144	<20	<106	
Support Truck bed front	0	<23	0	<144	<20	<106	
Pickup bed Front Driver	0	<23	0	<144	<20	<106	
Pickup bed Rear Driver	0	<23	0	<144	<20	<106	
Pickup bed middle	1	<23	7	<144	<20	<106	
Pickup bed Passenger Front	0	<23	12	<144	<20	<106	
Pickup bed Passenger rear	3	<23	0	<144	<20	<106	
Pickup bed Bumber	3	<23	0	<144	<20	<106	
Pickup Pedal / Floorboard	0	<23	0	<144	<20	<106	
		NA		NA			

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-19-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: IA-A Soil Boring
DATE: 9-18-00 | TIME: 0730-1800
PURPOSE OF SURVEY: Drilling Coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
43-89	163738 /169232	6/25/01 / 6-25-01	0α	15%
2929	109535	9/11/01	1α / 92β	37.8% / 33.2%
		N A		

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Drill Adapter Shoe	0	<23	17	<144	<20	<20	<106	NA
Bore tube(1) out	1	<23	0	<144	<20	<20	<106	
Bore tube(1) in	2	<23	0	<144	<20	<20	<106	
Bore tube(2) out	3	<23	0	<144	<20	<20	<106	
Bore tube(2) in	1	<23	20	<144	<20	<20	<106	
Bore tube(3) out	2	<23	0	<144	<20	<20	<106	
Bore tube(3) in	0	<23	17	<144	<20	<20	<106	
Bore shoe	1	<23	5	<144	<20	<20	<106	
Bore tube(4) out	2	<23	1	<144	<20	<20	<106	
Bore tube(4) in	2	<23	9	<144	<20	<20	<106	
Bore tube(5) out	2	<23	4	<144	<20	<20	<106	
Bore tube(5) in	1	<23	5	<144	<20	<20	<106	
Bore tube(6) in/out	2	<23	0	<144	<20	<20	<106	

REMARKS: Friskers were used to screen personnel during intrusive work in radiation areas. Hands, faces, boots and torso were screened. Hand tools were also ~~found~~ frisked. No α contamination above the minimum detectable limit was found on workers or tools in the course of survey.

TECHNICIAN(S) SIGNATURE/DATE: Darrell Landers / 9-18-00 /
REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC

RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: IA-A

DATE: 9-18-00 | TIME: 0730-1800 | HSWP:

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Pickup Truck Bed Front Driver	1	<23	28	<144	<20	<106	NA
Pickup Bed Rear Driver	2	<23	0	<144	<20	<106	
Pickup Bed Passenger Rear	2	<23	6	<144	<20	<106	
Pickup Bed Passenger Front	1	<23	0	<144	<20	<106	
Pickup Bed Center	2	<23	11	<144	<20	<106	
NA	NA						

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: Darrell Sanders / 9-18-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Samples / Coolers

DATE: 9-18-2000 | TIME: 1800

PURPOSE OF SURVEY: Verify radiological conditions prior to shipping

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	109535 / 119481	9-11-01 / 9-11-01	1α / 92β	.378α / .332β
Bicron MicroR	B347V	8-16-01 / 8-16-01	N/A	N/A
		N/A		

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
5 samples	Ø	<23	19	<144		N/A		<1/<1
4 samples	Ø	<23	1	<144				<1/<1
			N/A					

REMARKS:

- Composite smears taken.
- Dose rates are: contact / 1 meter.

TECHNICIAN(S) SIGNATURE/DATE: [signature] 9-19-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Painesville Survey Unit "A"

DATE: 9-15-2000 | TIME: 0800 - 1700

PURPOSE OF SURVEY: Geoprobe coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	109535 / 119481	9-11-01 / 9-11-01	1α / 92 β	37.8% / 33.2%
2224 / 43-89	163738 / 169232	6-25-01 / 6-25-01	0α / NA	15% / NA
Model 3 ~~2224~~ / 43-5	111409 / 113481	2-2-01 / 8-7-01	<20α / NA	10% / NA
Bicron μR	B347 √	8-16-01	NA / NA	NA / NA
N/A	N/A	N/A	N/A	N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
IA "A" 13 sample swipe	3	<23	0	<144				
IA "A" 13 samplers & fittings	0	<23	2	<144				
IA "A" 13 shelby tube	2	<23	6	<144				
IA "A" 13 Drill rig hand tools	0	<23	0	<144				
IA "A" 14 sample swipe	0	<23	0	<144				
IA "A" 14 samplers & fittings	0	<23	0	<144				
IA "A" 14 Shelby tube	3	<23	0	<144		N/A		
IA "A" 14 Drillers' gloves	1	<23	0	<144				
IA "A" 15 sample swipe	1	<23	2	<144				
IA "A" 15 samplers & fittings	0	<23	0	<144				
IA "A" 16 sample swipe	3	<23	0	<144				
IA "A" 16 samplers & fittings	0	<23	16	<144				
IA "A" 17 sample swipe	0	<23	12	<144				

REMARKS: Friskers were used to screen personnel doing intrusive work in radiation areas. Hands, faces, boots and torso were screened. Hand tools were also frisked. No α contamination above the minimum detectable limit was found on workers or tools in the course of this survey.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-15-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: Painesville Survey Unit "A" & Rubble pile sampling

DATE: 9-15-2000 | TIME: 0800-1700 | HSWP: N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
IA "A" 17 samplers & fittings	0	<23	0	<144			
IA "A" 18 sample swipe	0	<23	15	<144			
IA "A" 18 samplers and fittings	0	<23	7	<144			
IA "A" 19 Shelby tube	2	<23	7	<144			
IA "A" 19 interior of sampler	0	<23	4	<144			
IA "A" 19 sample swipe	1	<23	13	<144			
IA "A" 19 samplers	4	<23	0	<144			
IA "A" 20 sample swipe	0	<23	0	<144		N/A	
IA "A" 20 samplers	0	<23	8	<144			
Sample prep table	3	<23	0	<144			
RP sample 191	1	<23	0	<144			
RP poly on ground	3	<23	0	<144			
RP sample 192	1	<23	0	<144			
RP sample 193	1	<23	8	<144			
* JJ Truck Rear Tire & Flaps	0	<23	0	<144			
JJ Truck Pedals	1	<23	0	<144			
JJ Truck Front Tires & Flaps	0	<23	0	<144			
JJ Truck Bed	2	<23	2	<144			
		N/A					

REMARKS: RP = rubble pile
* JJ Truck license # W. Va. 688-727

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-15-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-21-00

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Samples / Coolers

DATE: 9-15-2000 TIME: 1505

PURPOSE OF SURVEY: Verify Conditions

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
BICRON	B 347 V	8-16-01	N/A	N/A
2929 / 43-10-1	109535 / 119481	9-11-01 / 9-11-01	1α / 92 β	37.8% / 33.2%
	N/A			

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Composite of 5 Samples	1	<23	34	<144				
Composite of 5 Samples	0	[illegible]	2					
Composite of 5 Samples	0		0					
Composite of 5 Samples	0		27			N/A		
Composite of 5 Samples	2		2					
Cooler #1 Exterior	[illegible]	[illegible]	[illegible]					
Cooler #2 Exterior	2	<23	25	<144				
		N/A						

REMARKS:
all micro R/hr readings, at 1 meter and contact, are < 1 μR/hr on the samples and coolers.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-15-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-15-2000

SAIC/EEMG

HP-405, REV.0
Attachment 1

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Survey unit "A"

DATE: 9-14-2000 | TIME: 0755 - 1205

PURPOSE OF SURVEY: Geoprobe coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	109535 / 119481	9-11-01 / 9-11-01	1α / 92 β	37.8% / 33.2%
2224 / 43-89	163739 / 169232	6-25-01 / 6-25-01	0α / NA	15% / NA
NA	NA	NA	NA	NA

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
IA "A" #6 - water tank on support truck	2	<23	0	<144				
IA "A" #6 sample swipe	2	<23	0	<144				
IA "A" #6 samplers & fittings	1	<23	0	<144				
IA "A" #7 sample swipe	6	<23	3	<144				
IA "A" #7 drill rig tools	2	<23	0	<144				
IA "A" #8 sample swipe	2	<23	2	<144				
IA "A" #8 samplers & fittings	1	<23	0	<144		N	A	
IA "A" #9 sample swipe	0	<23	2	<144				
Support truck left rear tires	2	<23	0	<144				
support truck right rear tires	0	<23	8	<144				
support truck front tires	0	<23	0	<144				
Drill rig left front tire and wheel well	0	<23	8	<144				
Drill rig left rear wheels	1	<23	12	<144				

REMARKS: Direct frisking with the 2224/43-89 meter & probe revealed no α fixed contamination above the detectable limit.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: Survey unit "A"

DATE: 9-14-2000 | TIME: 0755-1205 | HSWP: N/A

Description/Location	Net CPM α Removable	$dpm/100cm^2$ α Removable	Net CPM βγ Removable	$dpm/100cm^2$ βγ Removable	Net CPM α Total	$dpm/100cm^2$ α Total	Micro rem/hr
Drill rig hammer	0	<23	0	<144			
Drill rig right front tire and wheel well	0	<23	0	<144		N/A	
Drill rig front bumper	0	<23	5	<144			
Drill rig right rear wheels	0	<23	0	<144			
				N/A			

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Main office building
DATE: 9-14-2000 TIME: 1455
PURPOSE OF SURVEY: Contamination control for samples

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	109535 / 119481	9-11-01 / 9-11-01	1α / 92β	37.8% / 33.2%
2224 / 43-89	163739 / 169232	6-25-01 / 6-25-01	0α / NA	15% / NA
N/A	N/A	N/A	N/A	N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Swipe of 5 sample containers	1	<23	21	<144				
Swipe of 2nd 5 sample containers	1	<23	0	<144				
Swipe of last 4 sample containers and trip blank	2	<23	4	<144				
Swipe from Lonza borehole 3 including poly & sample container.	2	<23	8	<144				
Swipe from sample taken at IA "A" #	5	<23	30	<144			N/A	
		N A						

REMARKS: Direct frisks ~~calc~~ did not show any fixed contamination above the minimum detectable limit (for α) on any of the sample containers.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /
REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC

RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: AREA 'A'*/LONZA BY FENCE**

DATE: 9-14-2000 TIME: 1300 - 1700* / 0900**

PURPOSE OF SURVEY: JOB COVERAGE OF GEOPROBE WORK SOUTH OF BUTADIENE TK.

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
MODEL 3 / 43-5	111409/115481	2-2-01/8-7-01	<20 α	10% α
2929/43-10-1	109535/119481	9-11-01/9-11-01	1 / 92 β	.378/.332

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
LONZA HOLE 1 SAMPLE/BAG	1	<23	0	<144	<20	<20	<263	N/A
LONZA HOLE 2 SAMPLE/BAG	4	<23	13	<144	<20	<20	<263	
LONZA HOLE 3 SAMPLE/BAG	2	<23	18	<144	<20	<20	<263	
AREA 'A' HOLE 10 F/S TUBE	21	~~<23~~ 56	30	<144	<20	<20	<263	
AREA 'A' HOLE 11 F/S TUBE	13	~~<23~~ 34	25	<144	<20	<20	<263	
DRILL RIG BOTTOM PLATE	Ø	<23	Ø	<144	<20	<20	<263	
DRILL RIG AXES - 17:00	2	<23	Ø	<144	<20	<20	<263	
DRILL RIG BASE DECK-1700	1	<23	2	<144	<20	<20	<263	
DRILL RIG FLOOR	3	<23	1	<144	<20	<20	<263	
FRISK TABLE - 17:00	3	<23	6	<144	<20	<20	<263	N/A
AREA 'A' HOLE 12 F/S TUBE	Ø	<23	Ø	<144	<20	<20	<263	N/A
PICKUP TRUCK BED - 17:00	1	<23	6	<144	<20	<20	<263	
PICKUP TRUCK FLOOR 17:00	1	<23	Ø	<144	<20	<20	<263	N/A

REMARKS:

*ELEVATED 2"x2" SCAN ON SAMPLE, BKG≈10K, TUBE≈55K.

**AIR SAMPLE RUN DURING WORK.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000

REVIEWER SIGNATURE/DATE: [signature] / 9-15-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Lonza and IA "A"

DATE: 9-13-2000 | TIME: 0900 - 1700

PURPOSE OF SURVEY: Geoprobe coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	109535 / 119481	9-11-01 / 9-11-01	1α / 92 β	37.8% / 33.2%
2224 / 43-89	163739 / 169232	6-25-01 / 6-25-01	0α / NA	15% / NA
NA	NA	NA	NA	NA

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Drill rig right rear tires prior to Lonza drilling	0	<23	2	<144				
Drill rig left rear tires prior to Lonza drilling	2	<23	9	<144				
Drill rig leveling jacks prior to Lonza drilling	1	<23	1	<144				
Drill rig mast & hammer prior to Lonza drilling	8	<23	0	<144				
Drill rig right front tire prior to Lonza drilling	0	<23	12	<144				
Drill rig left tire prior to Lonza drilling	0	<23	1	<144				
Sample prep table prior to 1st Lonza sample	0	<23	0	<144		N/A		
Surface of concrete drive adjacent to borehole #1	0	<23	1	<144				
Methane gas pipeline near borehole #1	0	<23	0	<144				
IA "C" #1 sample swipe	0	<23	4	<144				
Samplers & fittings after 1st Lonza sample taken	1	<23	0	<144				
IA "C" #2 sample swipe	0	<23	0	<144				
IA "C" #2 samplers & fittings	0	<23	0	<144				

REMARKS: Frisking with the 2224/43-89 detected no α contamination (fixed) above the minimum detectable limit.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 ____ / ____

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: Louza and IA "A"

DATE: 9-13-2000 | TIME: 0900 - 1700 | HSWP: N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
IA "A" #4 sample swipe	0	<23	0	<144			
IA "A" #4 drill rig tools	2	<23	0	<144			
IA "A" #4 samplers & fittings	0	<23	5	<144			
IA "A" #4 Drill rig team's gloves	0	<23	0	<144			
IA "A" 4 swipe of sample containers	0	<23	3	<144			
IA "A" 4 shelby tube exterior	0	<23	0	<144		N/A	
IA "A" #5 sample swipe	2	<23	7	<144			
IA "A" #5 Drill rig tools	1	<23	6	<144			
IA "A" #5 Drill rig samplers & fittings	1	<23	0	<144			
			N/A				

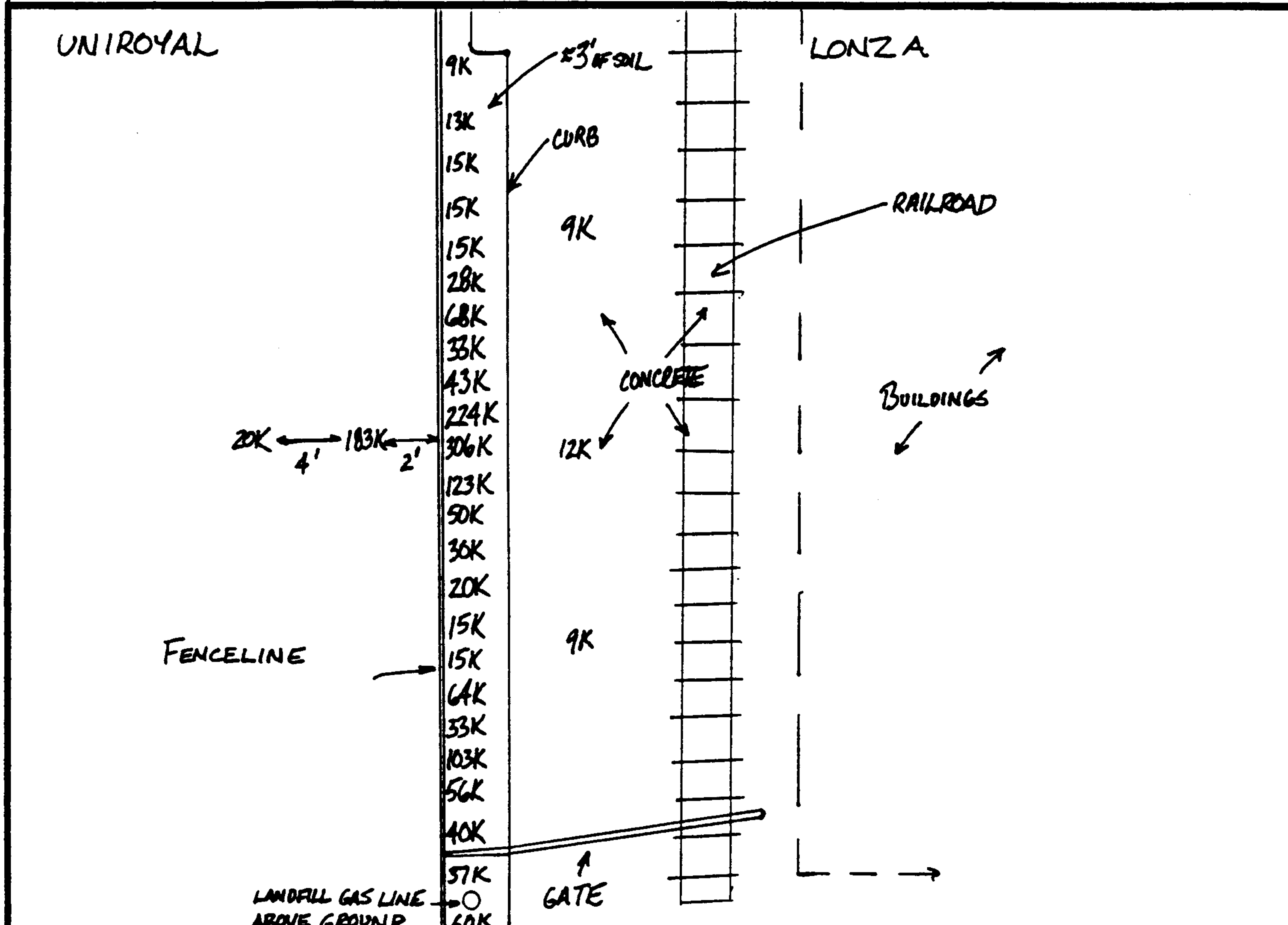
REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] 9-14-2000 /

REVIEWER SIGNATURE/DATE: /

SAIC
RADIOLOGICAL SURVEY REPORT (Map)
Painesville FUSRAP Site (Painesville, OH)

SURVEY LOCATION: At Lonza Fence		
DATE: 9/13/2000	TIME: 1030	HSWP No: N/A
LEGEND: See below. N/A 2"x2" meter 163694/169436, Cal due 5-12-01		



REMARKS:

All readings are contact with soil within 6" of fence.

All readings south of area on diagram are generally 7K-10K, except by gas line.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-13-2000 _______ /

REVIEWER SIGNATURE/DATE: Thomas [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: SAMPLES / COOLERS

DATE: 9-13-2000 TIME: 1600

PURPOSE OF SURVEY: VERIFY CONDITIONS

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
BICRON	B347V	8-16-01	N/A	N/A
2929 / 43-10-1	109535/119481	9-11-01/9-11-01	12/925	.378/.332
		N/A		

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
COMPOSITE OF 6 SAMPLES	2	<23	Ø	<144				<1/<1
COMPOSITE OF 11 SAMPLES	Ø	<23	Ø	<144				<1/<1
COOLER	3	<23	1	<144		N/A		<1/<1
COOLER	2	<23	1	<144				<1/<1
				N/A				

REMARKS:

DOSE RATES AT CONTACT / 1 METER

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Survey units "A", ~~and PB1~~ (initialed 9-14-00) P1B, and RP.

DATE: 9-12-2000 | TIME: 1015 - 1700

PURPOSE OF SURVEY: Geoprobe coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	109535 / 119481	9-11-01 / 9-11-01	1α / 92β	37.8% / 33.2%
2224 / 43-89	163739 / 169232	6-25-01 / 6-25-01	0α / NA	15% / NA
N/A	N/A	N/A	N/A	N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
IA "A" #1 sample swipe	2	<23	0	<144				
IA "A" #1 samplers & fittings	0	<23	0	<144				
IA "A" #2 samplers & fittings	0	<23	0	<144				
IA "A" #2 sample swipe	1	<23	0	<144				
IA "A" #3 samplers & fittings	0	<23	0	<144				
IA "A" #3 sample swipe	2	<23	7	<144				
IA "RP" #9 sample swipe	1	<23	10	<144		N/A		
IA "P1B" 16 sample swipe	3	<23	0	<144				
IA "P1B" #16 samplers & fittings	4	<23	0	<144				
J&J support truck front tires	0	<23	0	<144				
J&J support truck rear tires	0	<23	0	<144				
Drill rig tools	0	<23	0	<144				
Drill rig jack stands	0	<23	0	<144				

REMARKS: No fixed contamination (α) above the minimum detectable limit was discoved using the 43-89 frisker.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 _______ /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: Survey units "A", RP and P1B

DATE: 9-12-2000 TIME: 1015-1700 HSWP: N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Drill rig mast	0	< 23	0	< 144	N	A	
Drill rig tires	0	< 23	0	< 144			
				N/A			

REMARKS: No fixed contamination above the minimum detectable limit was discovered using the 43-89 frisker.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: SAMPLES/COOLERS/TRUCK
DATE: 9-12-2000 TIME: 1600
PURPOSE OF SURVEY: VERIFY CONDITIONS

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
BICRON	B347V	8-16-01	N/A	N/A
2929/43-10-1	109535/119481	9-11-01/9-11-01	1α/92β	.378/.332
		N/A		

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
COMPOSITE OF 7 SAMPLES	Ø	<23	9	<144				<1/<1
COOLER	1	<23	Ø	<144				<1/<1
COOLER	1	<23	Ø	<144		N/A		<1/<1
COMPOSITE OF 7 SAMPLES	Ø	<23	1	<144				<1/<1
		N/A						

REMARKS:
• DOSE RATES AT CONTACT/1 METER

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /
REVIEWER SIGNATURE/DATE: [signature] 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Rubble pile

DATE: 9-11-2000 | TIME: 0830 - 1630

PURPOSE OF SURVEY: Geoprobe coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 /43-10-1	109535/ 119481	9-11-01 /9-11-01	1α / 92β	37.8%/33.2%
Model 3/43-5	114409/ 113481	2-2-01 /8-7-01	<20α/NA	10% / NA
NA	NA	NA	NA	NA

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
RP#2 sample swipe	0	<23	8	<144				
RP#2 samplers & fittings	1	<23	0	<144				
RP#2 sample containers	2	<23	14	<144				
RP#3 sample swipe	2	<23	0	<144				
RP#3 Exterior swipe of plastic tube	1	<23	0	<144				
RP#3 Re-cored sample (2nd sample)	1	<23	12	<144				
RP#4 sample swipe	0	<23	0	<144				
RP#4 sampler & fittings	0	<23	6	<144		N/A		
RP#5 sample swipe	1	<23	0	<144				
RP#5 sampler & fittings	1	<23	0	<144				
RP#6 sample swipe	0	<23	0	<144				
RP#6 samplers & fittings	1	<23	1	<144				
RP#6 sample containers	0	<23	10	<144				

REMARKS: RP = rubble pile

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-01

SAIC
RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: Rubble pile

DATE: 9-11-2000 TIME: 0830-1630 HSWP: N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
RP#6 sample prep table	2	<23	6	<144			
RP#7 sample swipe	0	<23	0	<144			
RP#7 samplers & fittings	2	<23	7	<144			
RP#8 sample swipe	1	<23	0	<144			
RP#8 sampler & fittings	2	<23	5	<144		N/A	
RP#8 Shelby tube exterior	0	<23	0	<144			
* Swipe Composites of samples	0	<23	9	<144			
* Swipe Composites of samples	1	<23	12	<144			
* 2 Coolers	1	<23	0	<144			

N/A

REMARKS: * Composite and cooler swipes run on 9-13-2000 by Doug Haas.
Micro Rem readings using the Bicron dose rate meter were <1 uRem/hr on all samples and <1 uRem/hr on the sample coolers. Bicron 347V, C.D. 8-16-01

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Survey units P1B and IA "RP"

DATE: 9-8-2000 TIME: 0800 - 1500

PURPOSE OF SURVEY: Geoprobe coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	109535 / 119481	9-11-01 / 9-11-01	1α / 92β	37.8% / 33.2%
Model 3 / 43-5	114409 / 113481	2-2-01 / 8-7-01	< 20α / NA	10% / NA
NA	NA	NA	NA	NA

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
IA P1B #12 sample swipe	2	<23	11	<144				
IA P1B #12 samplers & fittings	1	<23	0	<144				
IA P1B #12 sample container	1	<23	21	<144				
P1B #13 sample swipe	0	<23	8	<144				
P1B #13 sample container	0	<23	0	<144				
P1B #14 sample swipe	3	<23	2	<144		NA		
P1B #14 samplers & fittings	3	<23	0	<144				
P1B #15 sample swipe	0	<23	4	<144				
P1B #15 shelby tube	0	<23	6	<144				
P1B #15 samplers & fittings	2	<23	16	<144				
		NA						

REMARKS: No fixed α contamination above the limit of detection was found using the Model 3/43-5 meter & probe.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Instrument room

DATE: 9-8-00 TIME: 1343

PURPOSE OF SURVEY: Contamination control for samples going to testing laboratories

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	143878 / 147628	10-7-00 / 10-7-00	0.3α / 64 β	36.7%α / 43.3% β
Bicron	B 354 V	8-19-01	N/A	N/A
N/A	N/A	N/A	N/A	N/A
↓	↓	↓	↓	↓

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
4 sample containers	0	<15	4	<94	N/A	N/A	N/A	N/A
2 Shelby tubes	1	<15	7	<94	↓	↓	↓	↓
5 sample containers	0	<15	1	<94				
4 sample containers + 1 Shelby	0	<15	3	<94				

N A

REMARKS: All samples in cooler <1 μRem contact and <1 μRem on surface of cooler.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: RUBBLE PILE

DATE: 9-8-2000 TIME: 1700

PURPOSE OF SURVEY: JOB COVERAGE

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
MODEL 3/43-5	111409/115481	2-2-01/8-7-01	<20 α	10%α
2929/43-10-1	109535/119481	9-11-01/9-11-01	1α/92β	.378/.332

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
IARP01 E/S TUBE	1	<23	~~8~~ 14 ∅	<144	<20	<20	<263	N/A
IARP01 SAMPLE	1	<23	5	<144	<20	<20	<263	
SHELBY TUBE	4	<23	7	<144	<20	<20	<263	
DRILL RIG POLE	∅	<23	1∅	<144	<20	<20	<263	
DRILL RIG FLOOR	1	<23	8	<144	<20	<20	<263	
SIDE OF J+J H₂O TRUCK	∅	<23	6	<144	<20	<20	<263	
BED OF J+J TRUCK	∅	<23	5	<144	<20	<20	<263	
PICKUP TRUCK BED	1	<23	∅	<144	<20	<20	<263	N/A
				N/A				

REMARKS:
• SMEARS COUNTED ON 9-13-2000.

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Samples/Coolers

DATE: 9-7-2000 TIME: 1600

PURPOSE OF SURVEY: Verify conditions

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
Bicron	B345V	8-17-01	- N/A -	- N/A -
2929/43-10-1	143878/147628	10-7-00/10-7-00	0.3α/64β	.367/.433
		N/A		

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Composite of 5 samples	Ø	<15	2	<94				<1/<1
Composite of 9 samples	Ø	<15	Ø	<94				<1/<1
Cooler #1 exterior	1	<15	5	<94		N/A		<1/<1
Cooler #2 exterior	Ø	<15	2	<94				<1/<1
Source box* exterior	Ø	<15	Ø	<94				<1/<1
			N/A					

REMARKS:
* SHIPPED TO STL. WITH STL. SOURCES
MICROREM/HR DOSE RATES AT CONTACT/1 METER

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-14-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-14-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: BY BUILDING FOUNDATIONS ON EAST SIDE OF SITE

DATE: 9-7-2000 TIME: 0830-1800

PURPOSE OF SURVEY: GEOPROBE SAMPLING COVERAGE

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2221/44-10	163694/169436	5-12-01/5-12-01	15651 γ	N/A
MODEL 3/43-5	111409/113481	2-2-01/8-7-01	<20 α	10% α
2929/43-10-1	143878/147628	10-7-00/10-7-00	0.3 α/64 β	36.7% α/43.3% β
N/A	N/A	N/A	N/A	N/A
↓	↓	↓	↓	↓

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
LOC. #5 - SAMPLE	Ø	<15	11	<94	<20	<20	<263	N/A
- FITTINGS/TOOLS	Ø	<15	12	<94	<20	<20	<263	
- WORK GLOVES	Ø	<15	11	<94	<20	<20	<263	
- SHELBY TUBE	Ø	<15	Ø	<94	<20	<20	<263	
LOC. #6 - SAMPLE	1	<15	Ø	<94	<20	<20	<263	
- FITTINGS/TOOLS	Ø	<15	20	<94	<20	<20	<263	
LOC. #7 - SAMPLE	Ø	<15	4	<94	<20	<20	<263	
- SHELBY TUBE	Ø	<15	Ø	<94	<20	<20	<263	
- FITTINGS/TOOLS	Ø	<15	8	<94	<20	<20	<263	
- ADDTL. SAMPLES	Ø	<15	Ø	<94	<20	<20	<263	
DRUM DOLLY	1	<15	11	<94	<20	<20	<263	
LOC. #8 - SAMPLES	1	<15	12	<94	<20	<20	<263	
- SAMPLE TUBES	Ø	<15	1	<94	<20	<20	<263	N/A

REMARKS:
LOC. = BOREHOLE #
ALL SAMPLING LOCATIONS OUTSIDE OF DESIGNATED RESTRICTED AREAS.
ALL EXTRACTED SOIL SCANNED WITH 44-10, ALL <2000 CPM > BKG. (BKG. ≈4500-6300 CPM AT SAMPLE TABLE)

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-8-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-8-2000

SAIC
RADIOLOGICAL SURVEY REPORT (Supplement)

SURVEY LOCATION: BY BUILDING FOUNDATIONS ON EAST SIDE OF SITE

DATE: 9-7-2000 TIME: 0830-1800 HSWP: N/A

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
LOC #9 - SAMPLE TUBE	3	<15	Ø	<94	<20	<263	N/A
- SAMPLE TUBE 2	Ø	<15	Ø	<94	<20	<263	
- O/S SAMPLE TUBE	Ø	<15	14	<94	<20	<263	
- O/S TUBE 2	Ø	<15	3	<94	<20	<263	
- SAMPLES	1	<15	6	<94	<20	<263	
LOC #10 - GEOTEK SMPL/BOWL	1	<15	11	<94	<20	<263	
- SAMPLER (METAL)	Ø	<15	13	<94	<20	<263	
- I/S TUBE	Ø	<15	6	<94	<20	<263	
- O/S TUBE	Ø	<15	2Ø	<94	<20	<263	
LOC #11 - SHELBY TUBE	Ø	<15	Ø	<94	<20	<263	
- I/S TUBE	Ø	<15	Ø	<94	<20	<263	
- SAMPLE'S	Ø	<15	4	<94	<20	<263	
ALL GEOPROBE POLES	Ø	<15	Ø	<94	<20	<263	
TOP OF SAMPLE TABLE	Ø	<15	Ø	<94	<20	<263	
PICK-UP TRUCK BED	Ø	<15	6	<94	<20	<263	N/A

N/A

REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-8-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-8-2000

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Instrumentation room in Main building at Painesville site

DATE: 9-7-00 TIME: 1557

PURPOSE OF SURVEY: Contamination control for laboratory samples.

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2929 / 43-10-1	143878 / 147628	10-7-00/10-7-00	03 / 64	36.7%/ 43.3%
Bicron	B354V	8-19-01	NA	NA

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Composite swipe of 5 samples	0	< 15	7	< 94				
Composite swipe of 5 samples	0	< 15	4	< 94				
Composite swipe of 4 samples	0	< 15	12	< 94				
Composite swipe of 5 samples	0	< 15	2	< 94		NA		
Composite swipe of 5 samples	0	< 15	6	< 94				
Composite swipe of 5 samples	1	< 15	0	< 94				
Composite swipe of 4 samples	0	< 15	3	< 94				
			NA					

REMARKS: Micro rem/hr readings were taken on each individual sample container, on the surface of each sample cooler and at 1 meter from the sample cooler. None of the micro rem/hr readings was above background.

-COOLERS PV1 THROUGH PV3 ON THIS SURVEY

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-7-00 /

REVIEWER SIGNATURE/DATE: [signature] / 9-8-2000

SAIC

RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: INCOMING "DOUBLE J" GEOPROBE RIG

DATE: 9-6-2000 + 9-7-2000 TIME: 08:00 + 10:00

PURPOSE OF SURVEY: VERIFY RADIOLOGICAL CONDITIONS

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
MODEL 3/43-5	111409/113481	2-2-01/8-7-01	<20α	10%α
2929/43-10-1	143878/147628	10-7-00/10-7-00	0.3α/64β	36.7%α/43.3%β
N/A	N/A	N/A	N/A	N/A
↓	↓	↓	↓	↓

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	~~Micro-rem/hr~~ SMEAR NUMBER
GREEN H₂O CONTAINER - O/S	Ø	<15	10	<94	<20	<20	<263	1
↓ - I/S	Ø	<15	Ø	<94	<20	<20	<263	2
BLACK WASH CONTAINER	Ø	<15	Ø	<94	<20	<20	<263	3
REAR MUDFLAPS	Ø	<15	17	<94	<20	<20	<263	4
TRAILER WHEELS	Ø	<15	21	<94	<20	<20	<263	5
FRONT MUDFLAPS	Ø	<15	Ø	<94	<20	<20	<263	6
FLOORBOARD	Ø	<15	7	<94	<20	<20	<263	7
DOLLY	Ø	<15	Ø	<94	<20	<20	<263	8
BOTTOM OF MAST	Ø	<15	Ø	<94	<20	<20	<263	9
EQUIPMENT	Ø	<15	Ø	<94	<20	<20	<263	10
DECK PLATE	Ø	<15	Ø	<94	<20	<20	<263	11
RIG. CONTROLS	Ø	<15	Ø	<94	<20	<20	<263	12
AUGERS	Ø	<15	14	<94	<20	<20	<263	13

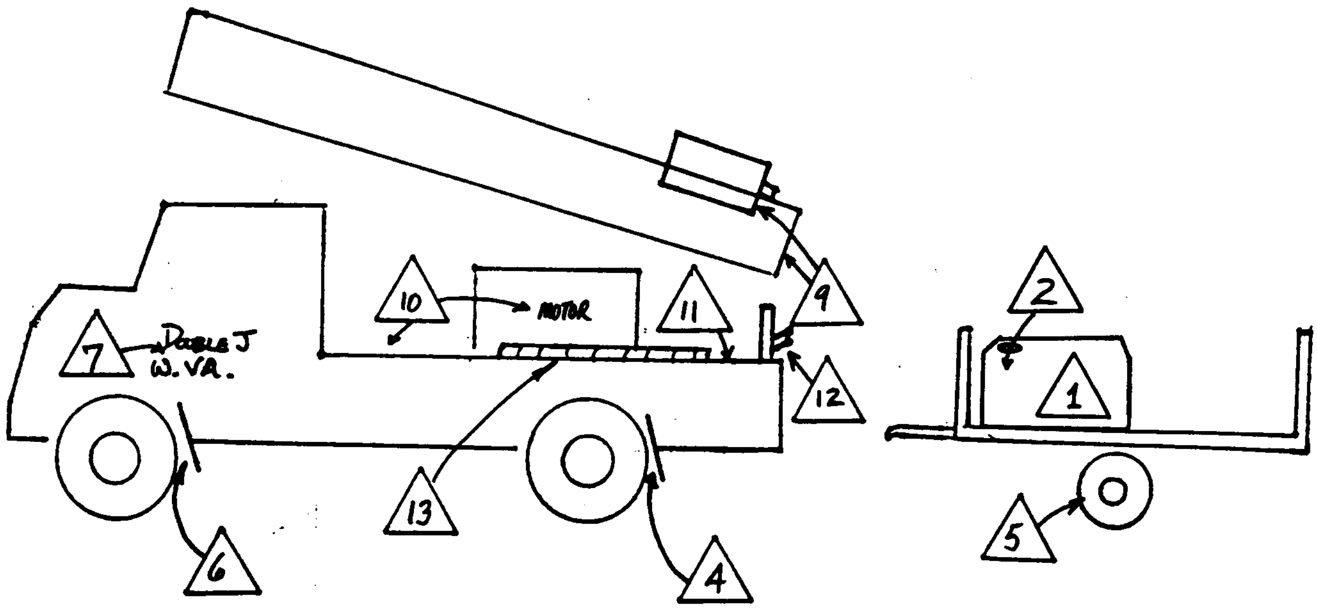
REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-7-2000 /

REVIEWER SIGNATURE/DATE: [signature] / 9-8-2000

SAIC
RADIOLOGICAL SURVEY REPORT (Map)
Painesville FUSRAP Site (Painesville, OH)

SURVEY LOCATION: Double 'J' Geoprobe Rig		
DATE: 9-6-2000 / 9-7-2000	TIME: 0800/1000	HSWP No: N/A
LEGEND: △ = CONTAMINATION SURVEY LOCATIONS		



REMARKS:

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-7-2000 ______ /

REVIEWER SIGNATURE/DATE: [signature] / 9-8-2000

SAIC/EEMG

HP-405, REV.0
Attachment 1

SAIC
RADIOLOGICAL SURVEY REPORT
Painesville FUSRAP Site

SURVEY LOCATION: Sample locations 1-4 in survey area P1B

DATE: 9-6-2000 | TIME: 1500-1830

PURPOSE OF SURVEY: Geoprobe sampling coverage

Instrument Type(s): (√ if used)	Serial Number: (meter/detector)	Cal Due Date: (meter-detector)	Background: (CPM α/βγ)	Efficiency (α/βγ)
2221 / 44-10	163694 / 169436	5-12-01/5-12-01	15651 γ	N/A
Model 3 / 43-5	111409 / 113481	2-2-01/8-7-01	< 20 α	10% α
2929 / 43-10-1	143878/ 147628	10-7-00/10-7-00	0.3α/64 β	36.7%/43.3% β
N/A	N/A	N/A	N/A	N/A
↓	↓	↓	↓	↓

Description/Location	Net CPM α Removable	dpm/100cm² α Removable	Net CPM βγ Removable	dpm/100cm² βγ Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm² α Total	Micro rem/hr
Sample prep. table before sampling begins	0	<15	0	<94	< 20	< 20	< 263	N/A
Loc #1 swipe of sample core	0	<15	0	<94	< 20	< 20	< 263	
↓ Sampler, fittings and tools	1	<15	0	<94	< 20	< 20	< 263	
Loc #2 swipe of sample core	0	<15	0	<94	< 20	< 20	< 263	
↓ Sampler, fittings and tools	0	<15	0	<94	< 20	< 20	< 263	
Loc. #3 swipe of sample core	0	<15	0	<94	< 20	< 20	< 263	
↓ Sampler, fittings and tools	0	<15	0	<94	< 20	< 20	< 263	
Loc #4 swipe of sample core	0	<15	0	<94	< 20	< 20	< 263	
Sampler, fittings and tools	0	<15	0	<94	< 20	< 20	< 263	
Drill rig	0	<15	1	<94	< 20	< 20	< 263	
Drill crew-survey out	0	<15	0	<94	< 20	< 20	< 263	
↓ Drill rig tools	0	<15	0	<94	< 20	< 20	< 263	↓
								N/A

REMARKS:
LOC. = BOREHOLE #
ALL Sampling locations outside of designated restricted areas.
ALL extracted soil scanned with 44-10, All < 2000 cpm above BKG. (BKG. = 4500-6300 cpm at sample table)

TECHNICIAN(S) SIGNATURE/DATE: [signature] / 9-8-00 | /

REVIEWER SIGNATURE/DATE: [signature] / 9-8-2000

SAIC RADIOLOGICAL AIR SAMPLE REPORT
PAINESVILLE FUSRAP SITE (PAINESVILLE, OH)

Location: Painesville IA-A, Lanza Sampled By: Darrell Landers

Monitored Workers: (. am .)

Instrument Model: ELF Serial No.: 2077 Calibration Due Date: 8/25/01

Date/Start Time / Flow Rate:	9-20-00 0750 2.0 lpm
Date/Stop Time / Flow Rate:	9-20-00 0858 2.0 lpm

Date/Start Time / Flow Rate:	9-20-00 0935 2.0 lpm
Date/Stop Time / Flow Rate:	9-20-00 1130 2.0 lpm

9-20-00 1256 hrs 2.0
9.20.00/1800 hrs 2.0

Sample Volume = 2 (lpm) x 487 (minutes) = 974 Liters (A)

Counter: Ludlum 2929/43-10 Number: 109535/119481 Cal. Due: 9-11-01/9-11-01

Count Date: 9-21-00 Count Start Time: 1200 Count Stop Time: 1210

ALPHA

Sample counts	22	counts
Sample count rate	2.2	CPM
Background count rate	1.5	CPM
Net count rate	0.7	CPM (B)
Counter efficiency	.378	(C)
Collection efficiency	.99	(D)
Efficiency = (C)x(D)	.374	(E)
Activity = (B)/(E)	1.9	(F)
Conc. = (F) / (2.22 E 9 X A)	8.6 E-13	(G)
DAC = (G) / (DAC value)	<0.1 (<.57) MDA	

Calculated By: [signature] Date: 9-21-00

Reviewed By: Daniel Sandy Date: 9-21-00

<BKG B-

SAIC/EEMG

HP-405, REV.0

SAIC RADIOLOGICAL AIR SAMPLE REPORT
PAINESVILLE FUSRAP SITE (PAINESVILLE, OH)

Location: Painesville 1A-A Sampled By: Darrell Landers

Monitored Workers:

Instrument Model: ELF Serial No.: 2077 Calibration Due Date: 8/25/01

Date/Start Time / Flow Rate:	9-19-00	0756	2.0 lpm
Date/Stop Time / Flow Rate:	9-19-00	1151	2.0 lpm

Date/Start Time / Flow Rate:	9-19-00	1400	2.0 lpm
Date/Stop Time / Flow Rate:	9-19-00	1632	2.0 lpm

Sample Volume = 2 (lpm) × 387 (minutes) = 774 Liters (A)

Counter: Ludlum 2929/43-10 Number: 101535/119481 Cal. Due: 9-11-01/9-11-01

Count Date: 9-21-00 Count Start Time: 0900 Count Stop Time: 0910

ALPHA

Sample counts	13	counts
Sample count rate	1.3	CPM
Background count rate	1.5	CPM
Net count rate	Ø	CPM (B)
Counter efficiency	.378	(C)
Collection efficiency	.99	(D)
Efficiency = (C)x(D)	.374	(E)
Activity = (B)/(E)	<MDA	(F)
Conc. = (F) / (2.22 E 9 X A)	MDA = 5.76^-12	(G)
DAC = (G) / (DAC value)	<.57 MDA	

Calculated By: [signature] Date: 9-21-00

Reviewed By: Darrell Landers Date: 9-21-00

< BKG 13

SAIC RADIOLOGICAL AIR SAMPLE REPORT
PAINESVILLE FUSRAP SITE (PAINESVILLE, OH)

Location: IA-A Sampled By: Darrell Landers

Monitored Workers:

Instrument Model: ELF Serial No.: 2077 Calibration Due Date: 8/25/01

Date/Start Time / Flow Rate:	9/18/00 2.05 lpm 0905
Date/Stop Time / Flow Rate:	9/18/00 1135 2.00 lpm

Date/Start Time / Flow Rate:	9/18/00 1415 2.0 lpm
Date/Stop Time / Flow Rate:	9/18/00 1608 2.0 lpm

Sample Volume = 2 (lpm) x 318 (minutes) = 636 Liters (A)

Counter: Ludlum 2929/43-10 Number: 109535/189481 Cal. Due: 9-11-01 / 9-11-01

Count Date: ~~9-18-00~~ 9-20-00 Count Start Time: ~~0905~~ 1200 Count Stop Time: 1210

Hy 9-21-00   Hy 9-21-00

ALPHA

Sample counts	17	counts
Sample count rate	1.7	CPM
Background count rate	1.5	CPM
Net count rate	Ø	CPM (B)
Counter efficiency	.378	(C)
Collection efficiency	.99	(D)
Efficiency = (C)x(D)	.374	(E)
Activity = (B)/(E)	<MDA	(F)
Conc. = (F) / (2.22 E 9 X A)	MDA = 5.7 E-12	(G)
DAC = (G) / (DAC value)	<.57 (MDA)	

Calculated By: Darrell Landers Date: 9-21-00

Reviewed By: [signature] Date: 9-21-00

4 ncpm β

SAIC RADIOLOGICAL AIR SAMPLE REPORT
PAINESVILLE FUSRAP SITE (PAINESVILLE, OH)

Location: Area 'A' Sampled By: Schnitzius

Monitored Workers:

Instrument Model: Lapel Air Serial No.: 2077 Calibration Due Date: 8-25-2001

Date/Start Time / Flow Rate:	9-15-2000 / 0809 / 2 LPM
Date/Stop Time / Flow Rate:	9-15-2000 / 1109 / 2 LPM

Date/Start Time / Flow Rate:	9-15-2000 / 1300 / 2 LPM
Date/Stop Time / Flow Rate:	9-15-2000 / 1500 / 2 LPM

Sample Volume = 2 (lpm) × 300 (minutes) = 600 Liters (A)

Counter: Ludlum 2929/43-10 Number: 109535/119481 Cal. Due: 9-1-01

Count Date: 9-18-2000 Count Start Time: 1710 Count Stop Time: 1720

ALPHA

Sample counts	14	counts
Sample count rate	1.4	CPM
Background count rate	1.5	CPM
Net count rate	Ø	CPM (B)
Counter efficiency	.378	(C)
Collection efficiency	.99	(D)
Efficiency = (C)x(D)	.374	(E)
Activity = (B)/(E)	<MDA	(F)
Conc. = (F) / (2.22 E 9 X A)	MDA=5.7E-12	(G)
DAC = (G) / (DAC value)	~~<.057~~ <.57 MDA	

Calculated By: [signature] Date: 9-18-2000

Reviewed By: Darrell Landry Date: 9-21-00

SAIC RADIOLOGICAL AIR SAMPLE REPORT
PAINESVILLE FUSRAP SITE (PAINESVILLE, OH)

Location: Area "A", locations S. of Est. Tk. Sampled By: Tom Schuitzius

Monitored Workers: __________

Instrument Model: Lapel Serial No.: 2077 Calibration Due Date: 8-25-2001

Date/Start Time / Flow Rate:	9/14/2000 - 0820 - 2 LPM
Date/Stop Time / Flow Rate:	9/14/2000 - 1300 - 2 LPM

Date/Start Time / Flow Rate:	9/14/2000 - 1410 - 2 LPM
Date/Stop Time / Flow Rate:	9/14/2000 - 1620 - 2 LPM

Sample Volume = 2 (lpm) × 410 (minutes) = 820 Liters (A)

Counter: Ludlum 2929/43-10 Number: 109535 / 119481 Cal. Due: 9-11-01 / 9-11-01

Count Date: 9/15/2000 Count Start Time: 1348 Count Stop Time: 1358

ALPHA

Sample counts	27	counts
Sample count rate	2.7	CPM
Background count rate	1	CPM
Net count rate	1.7	CPM (B)
Counter efficiency	.378	(C)
Collection efficiency	.99	(D)
Efficiency = (C)x(D)	.374	(E)
Activity = (B)/(E)	4.545	(F)
Conc. = (F) / (2.22 E 9 X A)	2.497 E-12	(G)
DAC = (G) / (DAC value)	.24 (<.57) ~~4.55~~	

Calculated By: Thomas Schuitzius Date: 9-15-2000

Reviewed By: [signature] Date: 9-21-00

HP-502 rev. 0
Attachment 7

Painesville

DOSIMETRY ISSUE / TERMINATION LOG

MONTH September YEAR 2000

NAME LAST, FIRST, M.I.	FORWARDING ADDRESS	SSN	HPID	BIOASSAY TYPE		DOSIMETER		ISSUE DATE	TERM. DATE	REMARKS
				INITIAL	EXIT	TYPE	SERIAL #			
1			PV1	N/A	N/A	Panasonic	10921100090l	9-5-2000	9-22-2000	
2			PV2	N/A	N/A	Panasonic	109212000901 ~~109212000901~~	9-5-2000	9-15-2000	
3			PV3	N/A	N/A	Panasonic	109211300090l ~~10921100901~~	9-5-2000	9-22-2000	
4			PV4	N/A	N/A	Panasonic	109211400090l	9-5-2000	9-22-2000	
5			PV5	N/A	N/A	Panasonic	109211500090l	9-5-2000	9-22-2000	
6			PV6	N/A	N/A	Panasonic	109216000901 ~~109211600090l~~	9-5-2000	9-15-2000	
7			PV7	N/A	N/A	Panasonic	109217000901	9-5-2000	9-15-2000	
8			PV8	N/A	N/A	Panasonic	109218000901	9/6/2000	9-6-2000	1 DAY ONLY
9			PV9	N/A	N/A	Panasonic	10219000901	9-5-2000	9-22-2000	
10			PV10	N/A	N/A	Panasonic	10220000901 ~~1022~~	9-5-2000	9-22-2000	
11-			PV11	N/A	N/A	Panasonic	109221000901	9-18-00	9-22-2000	
12			PV12	N/A	N/A	Panasonic	10922200090l	9-19-00	9-19-00	1 DAY ONLY

DOSIMETRY TYPE: S=SRD T=TLD ED=Electronic Dosimeter ~~Control TLD is PV 1~~ NA

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: 1 SSN: Date: 9-5-2000

Date of Birth: Company: SAIC Phone:

Permanent Home Address:

Street Address

City State Zip

Sex: ☑ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☑ SAIC-EEMG ☐ Other

RADWORKER TRAINER

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☑ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☑ YES ☐ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

1

Signature 9-5-2000 Date PV1 Health Physics Identification Number (HPID)

Reviewed By: 2 Date: 9-5-2000

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

NAME: 1 **SSN:**

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
1/1/2000	PRESENT	ST. LOUIS. FUSRAP	USACE (SAIC)	ST. ANN, MO.	.010	Record ☐ Written Estimate ☐ Best Personal Est. ☑
8/19/2000	8/31/2000	NIAGARA FALLS STORAGE SITE FUSRAP	U.S.A.C.E. (SAIC/MAXIM)	LEWISTON N.Y.	.010	Record ☐ Written Estimate ☐ Best Personal Est. ☑
1/1/2000	1/20/2000	↓	↓	↓	.003	Record ☐ Written Estimate ☐ Best Personal Est. ☑
						Record ☐ Written Estimate ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): .023 REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): 2.2 REM (Best Personal Estimate ☑ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): 0.1 REM ~~(Unless extended, 0.5 Rem - current year whole body exposure)~~ N/A

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 4.977 REM

~~(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)~~ N/A

9-5-2000	9-5-00
The above information is correct to the best of my knowledge Individuals Signature — Date	Radiation Protection Manager or designee Signature — Date

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: 2 SSN: Date: 9-5-2000

Date of Birth: Company: SAIC Phone:

Permanent Home Address:
Street Address

City State Zip

Sex: ☑ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☑ SAIC-EEMG ☐ Other

Rad working training current (March 2000) and on file at SAIC in St. Louis.

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☑ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☑ YES ☐ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

Signature 9-5-2000 Date PV2 Health Physics Identification Number (HPID)

Reviewed By: Date: 9-5-2000

EXPOSURE ESTIMATE

NAME: 2 **SSN:**

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
3/1/2000	Present	St. Louis FUSRAP	U.S.A.C.E. (SAIC)	St. Ann, MO	.020	Record ☐ Written Estimate.. ☐ Best Personal Est. ☑
						Record ☐ Written Estimate.. ☐ Best Personal Est. ☐
						Record ☐ Written Estimate.. ☐ Best Personal Est. ☐
						Record ☐ Written Estimate.. ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): .020 REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): .050 REM (Best Personal Estimate ☑ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): 0.1 REM ~~(Unless extended, 0.5 Rem - current year whole body exposure)~~

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 4.98 REM

~~(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)~~

9-5-2000 The above information is correct to the best of my knowledge Individuals Signature — Date	9-5-2000 Radiation Protection Manager or designee Signature — Date

HP-502 rev. 0
Attachment 5

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: 3 SSN: Date: 9-5-00

Date of Birth: Company: SAIC Phone:

Permanent Home Address:

Street Address

City State Zip

Sex: ☒ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☒ SAIC-EEMG ☐ Other

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☒ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☐ YES ☒ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

3 | 9-5-00 | PV3
Signature | Date | Health Physics Identification Number (HPID)

Reviewed By: Date: 9-5-2000

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

NAME: 3 **SSN:**

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
		NA →				Record ☐ Written Estimate..☐ Best Personal Est.☐
						Record ☐ Written Estimate..☐ Best Personal Est.☐
						Record ☐ Written Estimate..☐ Best Personal Est.☐
						Record ☐ Written Estimate..☐ Best Personal Est.☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): Ø REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): <0.1 REM (Best Personal Estimate ☐ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): 0.1 REM ~~(Unless extended, 0.5 Rem - current year whole body exposure)~~

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 5 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

The above information is correct to the best of my knowledge Individuals Signature	Date	Radiation Protection Manager or designee Signature	9-5-2000 Date

CERTIFICATE OF COMPLETION

Presented To:

3

For successfully completing:

RADWORKER TRAINING

[Mandated by 10 CFR 19.12 and EM 385-1-1]

Class Date: 9-5-2000 **Instructor:** Douglass A. Haas

Class Location: PAINESVILLE, OH

Science Applications International Corporation
An Employee-Owned Company

COURSE: Radiation Worker Training	DATE: 9/5/00	INSTRUCTOR: Doug Haas
SCORE: 95 %	SSN:	STUDENT: 3

RADIATION WORKER TRAINING

EXAMINATION

Niagara Version

This is a **20 question multiple choice examination** covering the information presented in the Radiation Worker Training course. **Passing score is 70% or greater**. This means that each question is worth 5 points each and you may miss six questions and still pass the examination. Read each question carefully and then **circle the letter of the one most correct answer**.

By my signature I have indicated that the answer responses on this exam are my own and that after the grading of the exam, I was given the opportunity to review and question the scoring of my question responses. My signature also indicates that I have read Regulatory Guide 8.13 and Regulatory Guide 8.29.

STUDENT SIGNATURE: 3 DATE: 9/5/00

By my signature I have indicated the grading of this exam by a predetermined answer key. I have given the student the opportunity to review and question all scoring of his or her responses on the exam.

INSTRUCTOR SIGNATURE: [signature] DATE: 9-5-00

1) Which of the following identifies the three basic particles that make up an atom?

a) Protons, neutrons, & electrons

b) Alpha, beta, & gamma

c) Chevrons, positrons, & bygones

d) Protons, gamma, & electrons

2) Which of the following best defines the term ionization?

a) Radioactive material in an unwanted location

b) Material emitting energy

c) The process of removing electrons from neutral atoms

d) The process of stabilizing atoms

3) The four basic types of ionizing radiation are:

a) Electrons, neons, positrons, & neutrons

b) Alpha, beta, gamma, & neutrons

c) Chevrons, positrons, gamma, & neutrons

d) Beta, gamma, x-rays, microwaves

4) Which type of radiation is an electromagnetic wave or photon and is a primary source of an individual's external whole body dose?

a) Gamma

b) Alpha

c) Beta

d) Neutrons

5) What is the average annual radiation dose to a member of the general population in the United States from both natural and manmade background radiation sources?

a) 360 mrem

b) 1200 mrem

c) 5 mrem

d) 540 mrem

6) Which of the following is a source of **manmade** background radiation?

a) radon
b) medical x-rays
c) cosmic
d) sources in the earth's crust

7) Which of the following terms is best defined as " a large dose of radiation received over a short period of time?"

a) A genetic does
b) A cosmic dose
c) A chronic dose
d) An acute dose

8) What does the acronym **ALARA** stand for in reference to radiation exposure?

a) As Low As Reasonably Achievable
b) All Low Attenuating Radiations Activate
c) Always Let Another Run Ahead
d) Annual Limits Allow Reasonable Achievements

9) Which of the following best describes a method for reducing radiation exposure?

a) Decreasing your time in a radiation field.
b) Increasing the time spent in a radiation field.
c) Reducing the shielding between you and the radiation source.
d) Reducing the distance between you and the radiation field.

10) What is the purpose of the "No eating, drinking, smoking, or chewing" policy for restricted areas.

a) To reduce worker down time from unscheduled breaks.
b) To abide by the state smoke free air policy.
c) To support the Good Housekeeping Policy.
d) To minimize the potential for internal exposure.

11) Which of the following is used at the site for recording exposure to **gamma and beta** radiation?

a) SRD

b) Full face respirators

c) TLD

d) Urinalysis program

12) Which of the following statements provides a basic description of the proper use of dosimetry on the job?

a) Wear dosimetry at all times while within a five miles radius from the site to monitor for potential exposure to the local public.

b) While in an area controlled for radiological purposes, one out of every five workers should be wearing their dosimetry.

c) Wear dosimeters, between the waist and neck, at all times in areas controlled for radiological purposes.

d) Dosimetry is only to be used in the event of an emergency.

13) What method is used at the site to determine the presence of uranium in the body?

a) Whole Body Counting

b) Dosimetry issuance

c) Fecal sampling

d) Urinalysis

14) Which statement is true about when workers may receive written record of their occupational radiation exposure?

a) After termination of employment upon request

b) Monthly automatically generated by dosimetry

c) At the end of each work shift

d) Only when requested by a physician

15) The use of protective clothing in areas controlled for radiological purposes is to provide what protection to the worker?

a) Shielding from external whole body radiation exposure.

b) To reduce the effect of the body overheating due to the radiation in the area.

c) To maintain a sterile environment in the work area.

d) Protection from possible skin contamination.

16) Which of the following is the correct rate for surveying for contamination with a hand held frisker?

a) 1-2 inches per second
b) 6 inches per second
c) 20 minutes per frisk
d) 3 centimeters per minute

17) When personnel are determined to be contaminated, who must perform the decontamination process?

a) The worker which is contaminated
b) Health Physics personnel
c) The worker's immediate supervisor
d) The Radiation Safety Manager

18) Which type of radiation is normally associated with Lens of the Eye dose and Skin dose concerns?

a) Gamma
b) Alpha
c) Beta
d) Neutrons

19) Which of the following identify a possible effect to the unborn child due to exposure to ionizing radiation?

a) Hyperactivity
b) Low birth weight
c) Increased longevity
d) Decreased chance of childhood cancer

20) The Policy Concerning Prenatal Exposure states that….

a) No radiation exposure is permissible to the embryo/fetus.
b) The embryo/fetus exposure must be limited to 1,000 mrem/gestation period.
c) A woman can, but is not required to, declare herself as a declared pregnant worker.
d) Woman of childbearing age will not be permitted to enter radiation areas.

HP-502 rev. 0
Attachment 5

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: 4 SSN: Date: 9/5/00

Date of Birth: Company: SAIC Phone:

Permanent Home Address: Street Address

City State Zip

Sex: ☑ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☑ SAIC-EEMG ☐ Other

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☑ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☐ YES ☑ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

4 9/5/00 PV4

Signature Date Health Physics Identification Number (HPID)

Reviewed By: [signature] Date: 9-5-2000

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

NAME: ______ 4 **SSN:** ______

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
		~~LUCKEY, OH~~ ~~FUSRAP~~	NOT MONITORED THIS YEAR			Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): Ø REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): <0.010 REM (Best Personal Estimate ☑ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): 0.1 REM ~~(Unless extended, 0.5 Rem - current year whole body exposure)~~

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 5 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

______	9/5/00		9-5-00
The above information is correct to the best of my knowledge Individuals Signature	Date	Radiation Protection Manager or designee Signature	Date

CERTIFICATE OF COMPLETION

Presented To:

4

For successfully completing:

RADWORKER TRAINING

[Mandated by 10 CFR 19.12 and EM 385-1-1]

Class Date: 9-5-2000 **Instructor:** Douglass A. Haas

Class Location: PAINESVILLE, OH

Science Applications International Corporation
An Employee-Owned Company

COURSE: Radiation Worker Training	DATE: 9-5-00	INSTRUCTOR: Doug Haas

SCORE: 100 %	SSN:	STUDENT: 4

RADIATION WORKER TRAINING

EXAMINATION

Niagara Version

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STUDENT SIGNATURE:__________ DATE: 9-5-00

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INSTRUCTOR SIGNATURE: DHaas DATE: 9-5-00

1) Which of the following identifies the three basic particles that make up an atom?

a) Protons, neutrons, & electrons

b) Alpha, beta, & gamma

c) Chevrons, positrons, & bygones

d) Protons, gamma, & electrons

2) Which of the following best defines the term ionization?

a) Radioactive material in an unwanted location

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3) The four basic types of ionizing radiation are:

a) Electrons, neons, positrons, & neutrons

b) Alpha, beta, gamma, & neutrons

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d) Beta, gamma, x-rays, microwaves

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c) 5 mrem

d) 540 mrem

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a) Wear dosimetry at all times while within a five miles radius from the site to monitor for potential exposure to the local public.

b) While in an area controlled for radiological purposes, one out of every five workers should be wearing their dosimetry.

c) Wear dosimeters, between the waist and neck, at all times in areas controlled for radiological purposes.

d) Dosimetry is only to be used in the event of an emergency.

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d) 3 centimeters per minute

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d) Neutrons

19) Which of the following identify a possible effect to the unborn child due to exposure to ionizing radiation?

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b) Low birth weight

c) Increased longevity

d) Decreased chance of childhood cancer

20) The Policy Concerning Prenatal Exposure states that....

a) No radiation exposure is permissible to the embryo/fetus.

b) The embryo/fetus exposure must be limited to 1,000 mrem/gestation period.

c) A woman can, but is not required to, declare herself as a declared pregnant worker.

d) Woman of childbearing age will not be permitted to enter radiation areas.

HP-502 rev. 0
Attachment 5

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: ______ 5 SSN: ______ Date: 9-05-00

Date of Birth: ______ Company: SAIC Phone: ______

Permanent Home Address: ______
Street Address

______
City State Zip

Sex: ☒ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☒ SAIC-EEMG ☐ Other ______

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☒ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☒ YES ☐ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

______ 5 9-5-00 PV5
Signature Date Health Physics Identification Number (HPID)

Reviewed By: [signature] Date: 9-5-00

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

5
NAME: ____________ **SSN:** ____________

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
1/2/2000	1/30/2000	Nevada Test Site NTS Area 25	DOE/IT/SAIC	Las Vegas SAIC	0.5 (DON'T KNOW)	Record ☐ Written Estimate ☐ Best Personal Est. ☑
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): .5 REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): .5 REM (Best Personal Estimate ☐ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): .1 REM (~~Unless extended, 0.5 Rem - current year whole body exposure~~) D.A.

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 4.5 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

____________ 9-5-00 The above information is correct to the best of my knowledge Individuals Signature — Date	D.A. [signature] 9-5-00 Radiation Protection Manager or designee Signature — Date

CERTIFICATE OF COMPLETION

Presented To:

5

For successfully completing:

RADWORKER TRAINING

[Mandated by 10 CFR 19.12 and EM 385-1-1]

Class Date: 9-5-2000 **Instructor:** Douglass A. Haas

Class Location: PAINESVILLE, OH

Science Applications International Corporation
An Employee-Owned Company

COURSE: Radiation Worker Training	DATE: 9-5-00	INSTRUCTOR: Doug Haas
SCORE: 90 %	SSN:	STUDENT: 5

RADIATION WORKER TRAINING

EXAMINATION

Niagara Version

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STUDENT SIGNATURE:__________ DATE: 9-5-00

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INSTRUCTOR SIGNATURE: DATE: 9-5-00

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c) Wear dosimeters, between the waist and neck, at all times in areas controlled for radiological purposes.

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a) No radiation exposure is permissible to the embryo/fetus.

b) The embryo/fetus exposure must be limited to 1,000 mrem/gestation period.

c) A woman can, but is not required to, declare herself as a declared pregnant worker.

d) Woman of childbearing age will not be permitted to enter radiation areas.

HP-502 rev. 0
Attachment 5

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: ______ 6 SSN: ______ Date: 9-5-00

Date of Birth: ______ Company: SAIC Phone: ______

Permanent Home Address: ______
Street Address

______
City State Zip

Sex: ☑ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☑ SAIC-EEMG ☐ Other ______

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☑ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☐ YES ☑ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

______ 6 9-5-00 PNG
Signature Date Health Physics Identification Number (HPID)

Reviewed By: ______ Date: 9-5-2000

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

6

NAME: ______________________ **SSN:** ______________

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
		None →				Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): Ø REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): <0.1 REM (Best Personal Estimate ☑ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): 0.1 REM ~~(Unless extended, 0.5 Rem - current year whole body exposure)~~

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 5 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

____________ 9-5-00 The above information is correct to the best of my knowledge Individuals Signature Date	[signature] 9-5-2000 Radiation Protection Manager or designee Signature Date

CERTIFICATE OF COMPLETION

Presented To:
6

For successfully completing:

RADWORKER TRAINING

[Mandated by 10 CFR 19.12 and EM 385-1-1]

Class Date: 9 - 5 - 2000 **Instructor:** Douglass A. Haas

Class Location: PAINESVILLE, OH

Science Applications International Corporation
An Employee-Owned Company

COURSE: Radiation Worker Training	DATE: 9-5-00	INSTRUCTOR: Doug Haas
SCORE: 100 %	SSN:	STUDENT: 6

RADIATION WORKER TRAINING

EXAMINATION

Niagara Version

This is a **20 question multiple choice examination** covering the information presented in the Radiation Worker Training course. **Passing score is 70% or greater**. This means that each question is worth 5 points each and you may miss six questions and still pass the examination. Read each question carefully and then **circle the letter of the one most correct answer**.

By my signature I have indicated that the answer responses on this exam are my own and that after the grading of the exam, I was given the opportunity to review and question the scoring of my question responses. My signature also indicates that I have read Regulatory Guide 8.13 and Regulatory Guide 8.29.

STUDENT SIGNATURE: 6 DATE: 9-5-00

By my signature I have indicated the grading of this exam by a predetermined answer key. I have given the student the opportunity to review and question all scoring of his or her responses on the exam.

INSTRUCTOR SIGNATURE: DATE: 9-5-00

1) Which of the following identifies the three basic particles that make up an atom?

a) Protons, neutrons, & electrons

b) Alpha, beta, & gamma

c) Chevrons, positrons, & bygones

d) Protons, gamma, & electrons

2) Which of the following best defines the term ionization?

a) Radioactive material in an unwanted location

b) Material emitting energy

c) The process of removing electrons from neutral atoms

d) The process of stabilizing atoms

3) The four basic types of ionizing radiation are:

a) Electrons, neons, positrons, & neutrons

b) Alpha, beta, gamma, & neutrons

c) Chevrons, positrons, gamma, & neutrons

d) Beta, gamma, x-rays, microwaves

4) Which type of radiation is an electromagnetic wave or photon and is a primary source of an individual's external whole body dose?

a) Gamma

b) Alpha

c) Beta

d) Neutrons

5) What is the average annual radiation dose to a member of the general population in the United States from both natural and manmade background radiation sources?

a) 360 mrem

b) 1200 mrem

c) 5 mrem

d) 540 mrem

6) Which of the following is a source of **manmade** background radiation?

a) radon
b) medical x-rays
c) cosmic
d) sources in the earth's crust

7) Which of the following terms is best defined as " a large dose of radiation received over a short period of time?"

a) A genetic does
b) A cosmic dose
c) A chronic dose
d) An acute dose

8) What does the acronym **ALARA** stand for in reference to radiation exposure?

a) As Low As Reasonably Achievable
b) All Low Attenuating Radiations Activate
c) Always Let Another Run Ahead
d) Annual Limits Allow Reasonable Achievements

9) Which of the following best describes a method for reducing radiation exposure?

a) Decreasing your time in a radiation field.
b) Increasing the time spent in a radiation field.
c) Reducing the shielding between you and the radiation source.
d) Reducing the distance between you and the radiation field.

10) What is the purpose of the "No eating, drinking, smoking, or chewing" policy for restricted areas.

a) To reduce worker down time from unscheduled breaks.
b) To abide by the state smoke free air policy.
c) To support the Good Housekeeping Policy.
d) To minimize the potential for internal exposure.

11) Which of the following is used at the site for recording exposure to **gamma and beta** radiation?

a) SRD

b) Full face respirators

c) TLD

d) Urinalysis program

12) Which of the following statements provides a basic description of the proper use of dosimetry on the job?

a) Wear dosimetry at all times while within a five miles radius from the site to monitor for potential exposure to the local public.

b) While in an area controlled for radiological purposes, one out of every five workers should be wearing their dosimetry.

c) Wear dosimeters, between the waist and neck, at all times in areas controlled for radiological purposes.

d) Dosimetry is only to be used in the event of an emergency.

13) What method is used at the site to determine the presence of uranium in the body?

a) Whole Body Counting

b) Dosimetry issuance

c) Fecal sampling

d) Urinalysis

14) Which statement is true about when workers may receive written record of their occupational radiation exposure?

a) After termination of employment upon request

b) Monthly automatically generated by dosimetry

c) At the end of each work shift

d) Only when requested by a physician

15) The use of protective clothing in areas controlled for radiological purposes is to provide what protection to the worker?

a) Shielding from external whole body radiation exposure.

b) To reduce the effect of the body overheating due to the radiation in the area.

c) To maintain a sterile environment in the work area.

d) Protection from possible skin contamination.

16) Which of the following is the correct rate for surveying for contamination with a hand held frisker?

a) 1-2 inches per second

b) 6 inches per second

c) 20 minutes per frisk

d) 3 centimeters per minute

17) When personnel are determined to be contaminated, who must perform the decontamination process?

a) The worker which is contaminated

b) Health Physics personnel

c) The worker's immediate supervisor

d) The Radiation Safety Manager

18) Which type of radiation is normally associated with Lens of the Eye dose and Skin dose concerns?

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c) Beta

d) Neutrons

19) Which of the following identify a possible effect to the unborn child due to exposure to ionizing radiation?

a) Hyperactivity

b) Low birth weight

c) Increased longevity

d) Decreased chance of childhood cancer

20) The Policy Concerning Prenatal Exposure states that....

a) No radiation exposure is permissible to the embryo/fetus.

b) The embryo/fetus exposure must be limited to 1,000 mrem/gestation period.

c) A woman can, but is not required to, declare herself as a declared pregnant worker.

d) Woman of childbearing age will not be permitted to enter radiation areas.

HP-502 rev. 0
Attachment 5

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: 7 SSN: Date: 9/5/00

Date of Birth: Company: SAIC Phone:

Permanent Home Address:

Street Address

City State Zip

Sex: ☒ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☒ SAIC-EEMG ☐ Other

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☒ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☐ YES ☒ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

7 9/5/00 PV5BB PV7

ure Date Health Physics Identification Number (HPID)

Reviewed By: Date: 9-5-2000

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

NAME: 7 **SSN:** - - -

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
			← N/A →			Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): 0 REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): 0 REM (Best Personal Estimate ☐ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): 0.1 REM ~~(Unless extended, 0.5 Rem - current year whole body exposure)~~

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 5 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

9-5 2000 The above information is correct to the best of my knowledge Individuals Signature Date	9-5-2000 Radiation Protection Manager or designee Signature Date

CERTIFICATE OF COMPLETION

Presented To:
7

For successfully completing:

RADWORKER TRAINING

[Mandated by 10 CFR 19.12 and EM 385-1-1]

Class Date: 9-5-2000

Instructor: Douglass A. Haas

Class Location: PAINESVILLE, OH

SAIC
Science Applications International Corporation
An Employee-Owned Company

COURSE: Radiation Worker Training		DATE: 9.5.00	INSTRUCTOR: Doug Haas
SCORE: 95 %	SSN:	STUDENT: 7	

RADIATION WORKER TRAINING

EXAMINATION

Niagara Version

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STUDENT SIGNATURE:_ ________________ DATE: 9/5/00

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INSTRUCTOR SIGNATURE:________________ DATE: 9-5-00

1) Which of the following identifies the three basic particles that make up an atom?

a) Protons, neutrons, & electrons

b) Alpha, beta, & gamma

c) Chevrons, positrons, & bygones

d) Protons, gamma, & electrons

2) Which of the following best defines the term ionization?

a) Radioactive material in an unwanted location

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3) The four basic types of ionizing radiation are:

a) Electrons, neons, positrons, & neutrons

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d) Beta, gamma, x-rays, microwaves

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c) Beta

d) Neutrons

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8) What does the acronym ALARA stand for in reference to radiation exposure?

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b) While in an area controlled for radiological purposes, one out of every five workers should be wearing their dosimetry.

c) Wear dosimeters, between the waist and neck, at all times in areas controlled for radiological purposes.

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b) Low birth weight

c) Increased longevity

d) Decreased chance of childhood cancer

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a) No radiation exposure is permissible to the embryo/fetus.

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c) A woman can, but is not required to, declare herself as a declared pregnant worker.

d) Woman of childbearing age will not be permitted to enter radiation areas.

HP-502 rev. 0
Attachment 5

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: ______ 8 SSN: ______ Date: 9/6/2000

Date of Birth: / / Company: SAIC Phone: ______

Permanent Home Address: ______ ______
Street Address

______ City ______ State ______ Zip ______

Sex: ☒ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☒ SAIC-EEMG ☐ Other ______

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☒ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☐ YES ☒ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct ~~to the best~~ of my knowledge.

______ Signature 8 9/6/2000 Date PV8 Health Physics Identification Number (HPID)

Reviewed By: [signature] Date: 9-6-2000

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

NAME: _ 8 **SSN:** _

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
			Not monitored	this year		Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): Ø REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): <0.1 REM (Best Personal Estimate ☑ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): 0.1 REM ~~(Unless extended, 0.5 Rem – current year whole body exposure)~~ 0.1

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 5 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

8 9/6/2000 The above information is correct to the best of my knowledge Individuals Signature — Date	[signature] 9-6-00 Radiation Protection Manager or designee Signature — Date

CERTIFICATE OF COMPLETION

Presented To:

8

For successfully completing:

RADWORKER TRAINING

[Mandated by 10 CFR 19.12 and EM 385-1-1]

Class Date: 9-5-2000 **Instructor:** Douglass A. Haas

Class Location: PAINESVILLE, OH

SAIC Science Applications International Corporation
An Employee-Owned Company

COURSE: Radiation Worker Training		DATE: 9-6-2000	INSTRUCTOR: Doug Haas (CHALLENGED)
SCORE: 95 %	SSN:	STUDENT: 8	

RADIATION WORKER TRAINING

EXAMINATION

Niagara Version

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STUDENT SIGNATURE:____________________ DATE: 9/6/2000

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INSTRUCTOR SIGNATURE: [signature] DATE: 9-6-2000

1) Which of the following identifies the three basic particles that make up an atom?

a) Protons, neutrons, & electrons

b) Alpha, beta, & gamma

c) Chevrons, positrons, & bygones

d) Protons, gamma, & electrons

2) Which of the following best defines the term ionization?

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9) Which of the following best describes a method for reducing radiation exposure?

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b) While in an area controlled for radiological purposes, one out of every five workers should be wearing their dosimetry.

c) Wear dosimeters, between the waist and neck, at all times in areas controlled for radiological purposes.

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b) Health Physics personnel
c) The worker's immediate supervisor
d) The Radiation Safety Manager

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c) Increased longevity
d) Decreased chance of childhood cancer

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a) No radiation exposure is permissible to the embryo/fetus.
b) The embryo/fetus exposure must be limited to 1,000 mrem/gestation period.
c) A woman can, but is not required to, declare herself as a declared pregnant worker.
d) Woman of childbearing age will not be permitted to enter radiation areas.

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: 9 SSN: Date: 9-5-2000

Date of Birth: Company: DJ Drilling Phone:

Permanent Home Address:
Street Address

City State Zip

Sex: ☑ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☐ SAIC-EEMG ☐ Other: DJ Drilling

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☑ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☐ YES ☑ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

9	9-5-00	PV9
Signature	Date	Health Physics Identification Number (HPID)

Reviewed By: [signature] Date: 9-5-2000

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

NAM_ 9 SSN:

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
		~~Federal~~ DA	← N/A	→		Record ☐ Written Estimate.. ☐ Best Personal Est. ☐
						Record ☐ Written Estimate.. ☐ Best Personal Est. ☐
						Record ☐ Written Estimate.. ☐ Best Personal Est. ☐
						Record ☐ Written Estimate.. ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): ~~<.1~~ Ø REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): <.1 REM (Best Personal Estimate ☐ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): 0.1 REM ~~(Unless extended, 0.5 Rem - current year whole body exposure)~~

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 5 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

9-5-00 The above information is correct to the best of my knowledge Individuals Signature Date	9-5-2000 Radiation Protection Manager or designee Signature Date

CERTIFICATE OF COMPLETION

Presented To:

9

_____ _______________

For successfully completing:

RADWORKER TRAINING

[Mandated by 10 CFR 19.12 and EM 385-1-1]

Class Date: 9-5-2000 **Instructor:** Douglass A. Haas

Class Location: PAINESVILLE, OH

SAIC Science Applications International Corporation An Employee-Owned Company

COURSE: Radiation Worker Training	DATE: 9-5-00	INSTRUCTOR: HAAS
SCORE: 70 %	SSN:	STUDENT: 9

RADIATION WORKER TRAINING

EXAMINATION

Niagara Version

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STUDENT **SIGNATURE**: ____________________ **DATE**: 9-5-00

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INSTRUCTOR SIGNATURE: ____________________ DATE: 9-5-00

1) Which of the following identifies the three basic particles that make up an atom?

a) Protons, neutrons, & electrons

b) Alpha, beta, & gamma

c) Chevrons, positrons, & bygones

d) Protons, gamma, & electrons

2) Which of the following best defines the term ionization?

a) Radioactive material in an unwanted location

b) Material emitting energy

c) The process of removing electrons from neutral atoms

d) The process of stabilizing atoms

3) The four basic types of ionizing radiation are:

a) Electrons, neons, positrons, & neutrons

b) Alpha, beta, gamma, & neutrons

c) Chevrons, positrons, gamma, & neutrons

d) Beta, gamma, x-rays, microwaves

4) Which type of radiation is an electromagnetic wave or photon and is a primary source of an individual's external whole body dose?

a) Gamma

b) Alpha

c) Beta

d) Neutrons

5) What is the average annual radiation dose to a member of the general population in the United States from both natural and manmade background radiation sources?

a) 360 mrem

b) 1200 mrem

c) 5 mrem

d) 540 mrem

6) Which of the following is a source of **manmade** background radiation?

a) radon
b) medical x-rays
c) cosmic
d) sources in the earth's crust

7) Which of the following terms is best defined as " a large dose of radiation received over a short period of time?"

a) A genetic does
b) A cosmic dose
c) A chronic dose
d) An acute dose

8) What does the acronym **ALARA** stand for in reference to radiation exposure?

a) As Low As Reasonably Achievable
b) All Low Attenuating Radiations Activate
c) Always Let Another Run Ahead
d) Annual Limits Allow Reasonable Achievements

9) Which of the following best describes a method for reducing radiation exposure?

a) Decreasing your time in a radiation field.
b) Increasing the time spent in a radiation field.
c) Reducing the shielding between you and the radiation source.
d) Reducing the distance between you and the radiation field.

10) What is the purpose of the "No eating, drinking, smoking, or chewing" policy for restricted areas.

a) To reduce worker down time from unscheduled breaks.
b) To abide by the state smoke free air policy.
c) To support the Good Housekeeping Policy.
d) To minimize the potential for internal exposure.

11) Which of the following is used at the site for recording exposure to **gamma and beta** radiation?

a) SRD

b) Full face respirators

c) TLD

d) Urinalysis program

12) Which of the following statements provides a basic description of the proper use of dosimetry on the job?

a) Wear dosimetry at all times while within a five miles radius from the site to monitor for potential exposure to the local public.

b) While in an area controlled for radiological purposes, one out of every five workers should be wearing their dosimetry.

c) Wear dosimeters, between the waist and neck, at all times in areas controlled for radiological purposes.

d) Dosimetry is only to be used in the event of an emergency.

13) What method is used at the site to determine the presence of uranium in the body?

a) Whole Body Counting

b) Dosimetry issuance

c) Fecal sampling

d) Urinalysis

14) Which statement is true about when workers may receive written record of their occupational radiation exposure?

a) After termination of employment upon request

b) Monthly automatically generated by dosimetry

c) At the end of each work shift

d) Only when requested by a physician

15) The use of protective clothing in areas controlled for radiological purposes is to provide what protection to the worker?

a) Shielding from external whole body radiation exposure.

b) To reduce the effect of the body overheating due to the radiation in the area.

c) To maintain a sterile environment in the work area.

d) Protection from possible skin contamination.

16) Which of the following is the correct rate for surveying for contamination with a hand held frisker?

a) 1-2 inches per second

b) 6 inches per second

c) 20 minutes per frisk

d) 3 centimeters per minute

17) When personnel are determined to be contaminated, who must perform the decontamination process?

a) The worker which is contaminated

b) Health Physics personnel

c) The worker's immediate supervisor

d) The Radiation Safety Manager

18) Which type of radiation is normally associated with Lens of the Eye dose and Skin dose concerns?

a) Gamma

b) Alpha

c) Beta

d) Neutrons

19) Which of the following identify a possible effect to the unborn child due to exposure to ionizing radiation?

a) Hyperactivity

b) Low birth weight

c) Increased longevity

d) Decreased chance of childhood cancer

20) The Policy Concerning Prenatal Exposure states that....

a) No radiation exposure is permissible to the embryo/fetus.

b) The embryo/fetus exposure must be limited to 1,000 mrem/gestation period.

c) A woman can, but is not required to, declare herself as a declared pregnant worker.

d) Woman of childbearing age will not be permitted to enter radiation areas.

HP-502 rev. 0
Attachment 5

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: 10 SSN: Date: 9-5-2000

Date of Birth: Company: JJ DRILLING Phone:

Permanent Home Address:
Street Address

City State Zip

Sex: ❑ Male ❑ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ❑ MAXIM ❑ SAIC-EEMG ☑ Other JJ DRILLING

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

❑ YES ☑ NO Have you ever been monitored for exposure to occupational radiation exposure?

❑ YES ☑ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

Signature 10 9-5-00 Date PV 10 Health Physics Identification Number (HPID)

Reviewed By: Date: 9-5-2000

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

NAME: [redacted] 10 **SSN:** [redacted]

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
				N/A		Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): Ø REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): Ø REM (Best Personal Estimate ☐ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): Ø.1 REM ~~(Unless extended, 0.5 Rem - current year whole body exposure)~~

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 5 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

______	9-5-00	______	9-5-2000
The above information is correct to the best of my knowledge Individuals Signature	Date	Radiation Protection Manager or designee Signature	Date

CERTIFICATE OF COMPLETION

Presented To:

10

For successfully completing:

RADWORKER TRAINING

[Mandated by 10 CFR 19.12 and EM 385-1-1]

Class Date: 9-5-2000 **Instructor:** Douglass A. Haas DA

Class Location: PAINESVILLE, OH

SAIC Science Applications International Corporation
An Employee-Owned Company

COURSE: Radiation Worker Training		DATE: 9-5-00	INSTRUCTOR: Doug Haas
SCORE: 80 %	SSN:	STUDENT: 10	

RADIATION WORKER TRAINING

EXAMINATION

Niagara Version

This is a **20 question multiple choice examination** covering the information presented in the Radiation Worker Training course. **Passing score is 70% or greater**. This means that each question is worth 5 points each and you may miss six questions and still pass the examination. Read each question carefully and then **circle the letter of the one most correct answer**.

By my signature I have indicated that the answer responses on this exam are my own and that after the grading of the exam, I was given the opportunity to review and question the scoring of my question responses. My signature also indicates that I have read Regulatory Guide 8.13 and Regulatory Guide 8.29.

STUDENT SIGNATURE:______________________ DATE: 9-5-00

By my signature I have indicated the grading of this exam by a predetermined answer key. I have given the student the opportunity to review and question all scoring of his or her responses on the exam.

INSTRUCTOR SIGNATURE: ______________________ DATE: 9-5-00

1) Which of the following identifies the three basic particles that make up an atom?

a) Protons, neutrons, & electrons

b) Alpha, beta, & gamma

c) Chevrons, positrons, & bygones

d) Protons, gamma, & electrons

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20) The Policy Concerning Prenatal Exposure states that....

a) No radiation exposure is permissible to the embryo/fetus.
b) The embryo/fetus exposure must be limited to 1,000 mrem/gestation period.
c) A woman can, but is not required to, declare herself as a declared pregnant worker.
d) Woman of childbearing age will not be permitted to enter radiation areas.

HP-502 rev. 0
Attachment 5

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: ______ 11 ______ SSN: ______ Date: 9-18-00

Date of Birth: ______ Company: Pangea ______ Phone: ______

Permanent Home Address: ______
Street Address

______
City State Zip

Sex: ☑ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☐ SAIC-EEMG ☑ Other Pangea

START 9/18.

RWT ON FILE IN STL.

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☑ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☑ YES ☐ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

______ 11 ______ 9-18-00 ______ PV11
Signature Date Health Physics Identification Number (HPID)

Reviewed By: [signature] Date: 9-18-2000

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

NAME: 11 **SSN:**

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
1/1/2000	8/17/2000	Weldon Spring Site Remediation	D.O.E	Weldon Spring, MO	.005	Record ☐ Written Estimate ☐ Best Personal Est. ☐
8/19/2000	~~8/14~~ 9/18/00 Present	St. Louis FUSRAP	USACE	St. Ann, MO	.005	Record ☐ Written Estimate ☐ Best Personal Est. ☑
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): .010 REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): 1.2 REM (Best Personal Estimate ☑ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): [illegible] REM (Unless extended, 0.5 Rem - current year whole body exposure)

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): 4.990 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

9-18-00 The above information is correct to the best of my knowledge Individuals Signature — Date	[signature] 9/18/2000 Radiation Protection Manager or designee Signature — Date

PERSONNEL INFORMATION / HSWP COMPLIANCE STATEMENT SHEET

Section 1 (Complete all information)

Name: 12 SSN: ____ Date: 9-19-00

Date of Birth: ____ Company: SAIC Phone: ____

Permanent Home Address: ____
Street Address

____ ____ ____
City State Zip

Sex: ☑ Male ☐ Female (If female, read and sign prenatal exposure statement)

Section 2 (Check the most appropriate box for the department you work for at the site)

Company: ☐ MAXIM ☑ SAIC-EEMG ☐ Other ____

RWT ON FILE IN STL

1 DAY ONLY

0700-1200

WALKOVER BY AREA 'A'

Section 3 (Check the appropriate box for each question. If you answer yes to the second question, complete Attachment 4)

☑ YES ☐ NO Have you ever been monitored for exposure to occupational radiation exposure?

☑ YES ☐ NO Have you been monitored for exposure to occupational radiation exposure this calendar year?

The above information is correct to the best of my knowledge.

____ 12 9-19-00 PV12
Signature Date Health Physics Identification Number (HPID)

Reviewed By: ____ Date: 9.19.00

HP-502 rev. 0
Attachment 4

EXPOSURE ESTIMATE

NAME: ______ 12 **SSN:** ______

Period of Time Monitored During the Current Year		Name of Facility or Site where monitored	Name of Licensee	Address of Licensee	TEDE Exposure (Rem)	
From	To					
1-1-00	Present	FUSRAP St. Louis	SAIC	9921 St. Charles Rock St. Ann MO, 63074	0.0	Record ☐ Written Estimate ☐ Best Personal Est. ☑
8-21-00	Present	Niagara Falls Storage Site	MAXIM	St. Louis, MO	< 0.5	Record ☐ Written Estimate ☐ Best Personal Est. ☑
						Record ☐ Written Estimate ☐ Best Personal Est. ☐
						Record ☐ Written Estimate ☐ Best Personal Est. ☐

CURRENT YEAR WHOLE BODY EXPOSURE (TEDE): <0.5 REM (Add all records/written estimates/personal estimates)

LIFETIME EXPOSURE (TEDE)): <0.5 REM (Best Personal Estimate ☐ or Record ☐)

CURRENT YEAR AVAILABLE ADMIN. EXPOSURE (TEDE): 0.10 REM (Unless extended, 0.5 Rem - current year whole body exposure)

CURRENT YEAR AVAILABLE FEDERAL EXPOSURE (TEDE): ~~5~~ 4.995 REM

(Reduce the available federal exposure by 1.25 Rems for each monitored quarter in which official exposure records or written estimates are not available)

9-19-00 The above information is correct to the best of my knowledge Individuals Signature Date	9-19-2000 Radiation Protection Manager or designee Signature Date

APPENDIX E

Electronic Soil Boring Logs

Painesville FUSRAP Site RI/FS

SAIC — An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0001

Painesville Site IAA	: SB0001
Start Date	: 09/12/00
End Date	: 09/12/00
Northing Coord.	: 232889.15 State Plane
Easting Coord.	: 704997.21 Meters NAD 83
Total Depth of Boring	: 11.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL	(0.0-0.25) CLAY; trace fine sand; moist; soft; medium plastic; 10YR3/3 dark brown.					
1	-1	FL		Rad gamma 8200 cpm		PVSB0001	0-4'	1450 Sample PVSB0001 collected 0.5-1.5 bgs for RAD analysis
2	-2		(0.25-1.4) FILL MATERIAL: cinders, gravel; moist; dense; 10YR2/1 black.					
3	-3	CL	(1.4-5.5) CLAY; trace fine to coarse sand; trace gravel to 8mm, subrounded; moist; hard; slightly plastic; 5Y5/3 olive. Wood pieces at bottom of interval.	PID 0 ppm			2.0'	
4	-4							
5	-5			Rad gamma 8200 cpm			4-8'	
6	-6	CL	(5.5-6.0) Silty CLAY; trace rootlets; trace fine sand; moist; stiff; slightly plastic; 5Y4/2 olive gray.					
		CL	(6.0-6.8) CLAY; trace fine sand; moist to dry; very stiff to hard; slightly plastic; 5Y4/1 dark gray grading to colors for interval below.					
7	-7			PID 0 ppm			3.0'	
8	-8			7600 cpm at 8' bgs				
9	-9	CL	(6.8-11.0) CLAY; trace fine sand; moist; very stiff; slightly plastic; 10YR5/8 yellowish brown mottled with 10YR4/6 dark yellowish brown and 10YR6/1 gray.	Peak reading 9000 cpm			8-11'	
10	-10			PID 0 ppm			3.0'	
11	-11		Bottom of Boring @ 11.0' bgs.					
12	-12							
13	-13							
14	-14							
15	-15							RAD BKG gamma = 27000 cpm
16	-16							
17	-17							1409 Begin drilling 1435 Finish drilling
18	-18							All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19							
20								

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0002

(Page 1 of 1)

Painesville Site IAA	: SB0002
Start Date	: 09/12/00
End Date	: 09/12/00
Northing Coord.	: 232874.02 State Plane
Easting Coord.	: 705005.36 Meters NAD 83
Total Depth of Boring	: 10.3 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GC		(0.0-0.3) GRAVEL to 20mm, subangular; some fine to very coarse sand; trace clay; 10YR6/4 light yellowish brown.					
1	-1	FL		(0.3-1.3) FILL MATERIAL: ash, coal pieces; dry; loose; non-plastic; 10YR2/1 black.	Rad gamma 10,000 cpm		PVSB0004	0-4'	1510 Sample PVSB0004 collected 0.3-1.3 bgs for RAD, TAL, & TCL analyses
2	-2	CL GP		(1.3-1.9) CLAY; trace roots; moist; soft; plastic; 5Y5/2 olive gray. (1.9-2.3) GRAVEL Zone; gravel to 25mm, angular; wet; dense.					
3	-3	CL			PID 0 ppm			2.9'	
4	-4			(2.3-4.5) CLAY; trace fine to medium sand; very stiff; medium plastic; 10YR4/4 dark yelowish brown.					
5	-5	CL		(4.5-5.0) Organic Clayey SILT; moist; soft; non-plastic; 10YR2/1 Black.	Rad gamma 8000 cpm			4-8'	
6	-6			(5.0-9.0) CLAY; trace fine sand; trace rootlets; moist; very stiff; plastic; 5Y4/2 olive gray and 5Y4/1 dark gray.					
7	-7	CL			PID 0 ppm			2.3'	
8	-8								
9	-9	ML		(9.0-9.5) SILT; some clay; trace fine sand; moist; loose; non-plastic; 10YR2/1 black.	Rad gamma 8500 cpm			8-12'	
10	-10	CL		(9.5-10.3) CLAY; trace fine sand; moist to dry; very stiff; medium plastic; 5Y4/1 dark gray mottled with 5Y3/1 very dark gray.					
11	-11				PID 0 ppm			2.3'	
12	-12			Bottom of Boring @ 10.3' bgs.					
13	-13								
14	-14								
15	-15								RAD BKG gamma = 24000 cpm
16	-16								
17	-17								1452 Begin drilling 1530 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

c:\Paine\IAASB002.BOR
12-20-2000

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0003

Painesville Site IAA	: SB0003
Start Date	: 09/12/00
End Date	: 09/12/00
Northing Coord.	: 232858.70 State Plane
Easting Coord.	: 704997.19 Meters NAD 83
Total Depth of Boring	: 10.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-1.7) SILT; trace fine sand; roots up in 0.0-0.2' bgs; trace gravel to 8mm; dry to moist; dense; non-plastic; 10YR4/4 dark yellowish brown.	Rad gamma 8400 cp			0-4'	
1	-1								
2	-2	CL		Geotextile Fabric at 1.7' bgs			PVSB0007		1558 Sample PVSB0007 collected 1.7-2.5' bgs for RAD analysis
		CL		(1.7-2.0) Silty CLAY; trace fine sand; moist; soft; medium plastic; 5Y3/1 very dark gray.					
3	-3				PID 0 ppm			2.5'	
				(2.0-5.0) CLAY; trace fine to medium sand; trace silt; moist to dry; very stiff; medium plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/3 brown and 10YR5/6 yellowish brown.					
4	-4								
5	-5	CL		(5.0-8.5) CLAY as above except Gray is dominate color with other colors mottling.	Rad gamma 8800 cpm			4-8'	
6	-6								
7	-7				PID 0 ppm			1.6'	
8	-8				Rad gamma 8400 cpm			8-10'	
9	-9	CL		(8.5-10.0) CLAY as above dominate color 10YR4/4 dark yellowish brown mottled with 10YR5/6 yellowish brown and 10YR5/1 gray.	PID 0 ppm			2.0'	
10	-10			Bottom of Boring @ 10.0' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 8000 cpm
16	-16								
17	-17								1537 Begin drilling 1556 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0004

(Page 1 of 1)

Painesville Site IAA : SB0004
Start Date : 09/13/00
End Date : 09/13/00
Northing Coord. : 232787.94 State Plane
Easting Coord. : 704955.14 Meters NAD 83
Total Depth of Boring : 6.0 feet

Drilling Company : Double J Drilling
Driller : Don Malone
Designation of Drill : Diedrich
Type of Drill Rig : Direct Push Technology
Geologist : Paul Parrish
Depth to Bedrock : Not Encountered
Depth Drilled Into Rock: NA
Borehole Diameter : 2.5 inches
Sampling Equipment : 4' Sampling Tube 2.25" OD
SS Bowl & Spoon : Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.3) FILL MATERIAL - Silty CLAY; trace roots; trace fine to medium sand; moist; soft; plastic; 10YR3/2 very dark grayish brown.			PVSB0010 PVSB9002 PVSB9501		
1	-1	FL			Rad gamma 11000 cp			0-4'	1546 Samples PVSB0010, PVSB9002, PVSB9501 collected 0.0-1.0' bgs for RAD, TAl, & TCL analyses
2	-2			(0.3-2.0) FILL MATERIAL - Silty SAND; some gravel to 25mm, subangular; brick pieces; dry; dense; non-plastic; 10YR6/4 light yellowish brown and 10YR6/3 pale brown.					
3	-3				PID 0 ppm			4.0'	
4	-4	CL		(2.0-6.0) Silty CLAY; trace fine sand; dry to moist; hard; slightly plastic; 10YR5/3 brown mottled 10YR5/2 grayish brown amd 10YR5/8 yellowish brown.	Rad gamma 11500 cpm			4-6'	
5	-5				PID 0 ppm	PVSB0011		2.0'	1550 Sample PVSB0011 collected 4.0-5.5 for geotechnical analysis
6	-6			Bottom of Boring @ 6.0' bgs.					
7	-7								
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 12000 cpm
16	-16								
17	-17								1453 Begin drilling 1509 Refusal at .75' in two holes moved location 5' west.
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAA-SB0005

(Page 1 of 1)

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAA	: SB0005
Start Date	: 09/13/00
End Date	: 09/13/00
Northing Coord.	: 232791.88 State Plane
Easting Coord.	: 704970.82 Meters NAD 83
Total Depth of Boring	: 5.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.2) FILL MATERIAL - SILT; some fine sand; roots; moist; loose; non-plastic; 10YR2/2 very dark brown.	Rad gamma 11000 cp		PVSB0013		
1	-1	FL		(0.2-0.6) FILL MATERIAL - Ash, glass, concrete pieces; dry; stiff; non-plastic; 10YR2/1 black.				0-4'	
2	-2	FL		(0.6-1.0) FILL MATERIAL - SILT; trace fine sand; dry; very stiff; non-plastic; 10YR5/6 yellowish brown.					1627 Sample PVSB0013 collected 0.0-1.0' bgs for RAD analysis
3	-3	ML		(1.0-4.5) SILT; trace fine sand; dry; very dense; non-plastic; 10YR5/4 yellowish brown mottled with 10YR5/6 yellowish brown and 10YR5/1 gray.	PID 0 ppm			3.25'	
4	-4								
5	-5	CL		(4.5-5.5) Silty CLAY; trace fine sand; dry; hard; slightly plastic; 10YR5/6 yellowish brown mottled with 10YR6/4 light yellowish brown and 10YR6/1 gray.	Rad gamma 11000 cpm			4-8'	
6	-6								
7	-7			Bottom of Boring @ 5.5' bgs.	PID 0 ppm			1.5'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 13000 cpm
16	-16								
17	-17								1612 Begin drilling 1638 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
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Painesville, Ohio

Soil Boring IAA-SB0006

(Page 1 of 1)

Painesville Site IAA : SB0006
Start Date : 09/14/00
End Date : 09/14/00
Northing Coord. : 232806.38 State Plane
Easting Coord. : 704968.87 Meters NAD 83
Total Depth of Boring : 6.1 feet

Drilling Company : Double J Drilling
Driller : Don Malone
Designation of Drill : Diedrich
Type of Drill Rig : Direct Push Technology
Geologist : Paul Parrish
Depth to Bedrock : Not Encountered
Depth Drilled Into Rock: NA
Borehole Diameter : 2.5 inches
Sampling Equipment : 4' Sampling Tube 2.25" OD
SS Bowl & Spoon : Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-4.2) FILL MATERIAL - CLAY; ash, concrete, brick; trace gravel; coal; some fine to medium sand; colors: 10YR2/1 black, 10YR4/1 very dark gray, 5YR5/8 yellowish red.	Rad gamma 8000 cpm - 1 9000 cpm - 2		PVSB0016	0-4' 1st 0.3'	
1	-1								
2	-2								0903 Sample PVSB0016 collected 0.0-1.0' bgs for RAD analysis
3	-3				PID 0 ppm			0-4' 2nd 3.5'	
4	-4	CL		(4.2-6.1) Silty CLAY; trace fine sand; dry; hard; slightly plastic; 10YR5/6 yellowish brown mottled with 10YR6/4 light yellowish brown and 10YR6/1 gray.	Rad gamma 8500 cpm			4-7'	
5	-5								
6	-6			Bottom of Boring @ 6.1' bgs.	PID 0 ppm			2.1'	
7	-7								
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 11500 cpm
16	-16								0825 Begin drilling
17	-17								0835 Pushed rock, blocked sample recovery. 0900 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAA-SB0007

(Page 1 of 1)

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAA	: SB0007
Start Date	: 09/14/00
End Date	: 09/14/00
Northing Coord.	: 232823.28 State Plane
Easting Coord.	: 704970.51 Meters NAD 83
Total Depth of Boring	: 9.4 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0 – 4.5	0 – -4	FL		(0.0-4.5) FILL MATERIAL - CLAY; gravel to 40mm, subangular; ash, coal, bricks, fire bricks, some fine to very coarse sand; dry to moist; hard; non-plastic; colors: 10YR2/1 black, 10YR5/2 grayish brown, 5YR5/8 yellowish red.	Rad gamma 8200 cpm - 1 Rad gamma 8500 cpm - 2 Rad gamma 9000 cpm - 3 PID spike 1100 ppm		PVSB0019 PVSB9502 PVSB9003	0-2' 1st 1.8' 0-2' 2nd 1.6' 0-4' 3rd 3.2'	0935 Samples PVSB0019, PVSB9502 and PVSB9003 collected 0.5-1.5' bgs. PVSB0019 for RAD, TAL, & TCL analyses. PVSB9502 and PVSB9003 for RAD analysis only.
4.5 – 6.8	-5 – -6	CL		(4.5-6.8) CLAY; trace medium sand; trace gravel to 25mm, subangular; moist; soft; very plastic; 5Y3/1 very dark gray.	Rad gamma 8500 cpm			4-8'	
6.8 – 9.4	-7 – -9	CL		(6.8-9.4) Same as above - 2" shelby tube collected.	PID 0 ppm	PVSB0020		2.8' 8-10' 1.4'	Water in hole at approximately 7' bgs 1000 Sample PVSB0020 collected 8.0-9.4' bgs Geotechnical
9.4 – 20	-10 – -19			Bottom of Boring @ 9.4' bgs.					RAD BKG gamma = 37000 cpm 0908 Setup on boring 0920 Refusal at 2', move forward and try again 0932 Refusal at 2' in second hole move again 1010 Finish drilling All colors from Munsell Soil Color Chart 1992 Revised Edition

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Soil Boring IAA-SB0008

(Page 1 of 1)

Painesville FUSRAP Site
USACE - Buffalo District
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Painesville, Ohio

Painesville Site IAA	: SB0008
Start Date	: 09/14/00
End Date	: 09/14/00
Northing Coord.	: 232800.82 State Plane
Easting Coord.	: 704934.11 Meters NAD 83
Total Depth of Boring	: 5.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0								
1	-1	FL		(0.0-1.5) FILL MATERIAL - CLAY; ash, concrete, colors: 10YR2/1 black, 10YR3/3 dark brown, 10YR4/2 dark grayish brown.	Rad gamma 12000 cpm		PVSB0022	0-4'	1050 Sample PVSB0022 collected 0.0-1.0' bgs for RAD analysis
2	-2	CL		(1.5-5.5) Silty CLAY; trace fine sand; dry to moist; hard; slightly plastic; 10YR5/4 yellowish brown mottled with 10YR5/8 yellowish brown and 10YR6/2 light brownish gray.					
3	-3				PID 0 ppm			2.5'	
4	-4				Rad gamma 12000 cpm			4-6'	
5	-5				PID 0 ppm			1.5'	
6	-6			Bottom of Boring @ 5.5' bgs.					Refusal at 6' bgs
7	-7								
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 12000 cpm
16	-16								
17	-17								1034 Begin drilling 1055 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville, Ohio

Soil Boring IAA-SB0009

(Page 1 of 1)

Painesville Site IAA : SB0009
Start Date : 09/14/00
End Date : 09/14/00
Northing Coord. : 232801.03 State Plane
Easting Coord. : 704937.53 Meters NAD 83
Total Depth of Boring : 5.0 feet

Drilling Company : Double J Drilling
Driller : Don Malone
Designation of Drill : Diedrich
Type of Drill Rig : Direct Push Technology
Geologist : Paul Parrish
Depth to Bedrock : Not Encountered
Depth Drilled Into Rock: NA
Borehole Diameter : 2.5 inches
Sampling Equipment : 4' Sampling Tube 2.25" OD
SS Bowl & Spoon : Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-1.0) FILL MATERIAL - ASH; clay; some fine to medium sand.	Rad gamma 12000 cpm		PVSB0025	0-4'	1108 Sample PVSB0025 collected 0.0-1.0' bgs for RAD analysis
1	-1	CL		(1.0-5.0) Silty CLAY; trace fine to coarse sand; trace gravel to 20mm, subangular; dry to moist; hard; slightly plastic; 10YR5/3 yellowish brown mottled with 10YR6/4 light yellowish brown and 10YR5/8 yellowish gray.					
2	-2								
3	-3				PID 0 ppm			3.1'	
4	-4				Rad gamma 12000 cpm			4-5'	
5	-5			Bottom of Boring @ 5.0' bgs.	PID 0 ppm			1.2'	Refusal at 5' bgs, hammer quit.
6	-6								
7	-7								
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 12000 cpm
16	-16								
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville, Ohio

Soil Boring IAA-SB0010

(Page 1 of 1)

Painesville Site IAA	: SB0010
Start Date	: 09/14/00
End Date	: 09/14/00
Northing Coord.	: 232823.83 State Plane
Easting Coord.	: 704985.56 Meters NAD 83
Total Depth of Boring	: 5.8 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-4.2) FILL MATERIAL - ASH; clay; some fine sand, concrete, coal; moist; medium dense; non-plastic.	13500 cpm at 4"			0-4'	
1	-1				18500 cpm at 1'				
2	-2				55000 cpm at 18"		PVSB0028		1454 Sample PVSB0028 collected 1.0-2.0' bgs for RAD analysis
3	-3				PID 0 ppm			2.0'	
4	-4				Rad gamma 12500 cpm			4-7'	
5	-5	CL		(4.2-5.8) Organic CLAY; trace rootlets;; trace fine to coarse sand; trace gravel to 8mm, subangular; moist; very soft; plastic; 5Y4/2 olive gray and 5Y4/1 dark gray and 5Y3/1 very dark gray.	PID 0 ppm			1.8'	
6	-6			Bottom of Boring @ 5.8' bgs.					
7	-7								Refusal at 7' bgs.
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 9000 cpm
16	-16								1453 Finish hole
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville, Ohio

Soil Boring IAA-SB0011

Painesville Site IAA	: SB0011
Start Date	: 09/14/00
End Date	: 09/14/00
Northing Coord.	: 232818.57 State Plane
Easting Coord.	: 704993.50 Meters NAD 83
Total Depth of Boring	: 6.2 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0								
0–2.3		FL		(0.0-2.3) FILL MATERIAL - CLAY; ash, coal, brick, gravel to 15mm, angular to subangular; some fine to coarse sand; moist; dense; non-plastic; colors: 10YR2/1 black, 10YR4/6 dark yellowish brown, and 10YR3/2 very dark grayish brown.	27000 cpm at 1' PID 0 ppm		PVSB0031	0-4' 1st 2.3'	1527 Sample PVSB0031 collected 0.7-1.2' bgs for RAD analysis
2.3–4.0				(2.3-4.0) No recovery.	9000 cpm at 1'			0-4' 2nd 2.3'	
4.0–6.2		CL		(4.0-6.2) CLAY; trace fine sand; 10YR5/8 yellowish brown mottled with 10YR4/6 dark yellowish brown and 10YR5/1 gray.	Rad gamma 9000 cpm PID 0 ppm			4-7' 2.2'	
6.2				Bottom of Boring @ 6.2' bgs.					
15	-15								RAD BKG gamma = 9000 cpm
16	-16								1454 Setup on boring 1525 Finish hole
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

Depth scale: 0 to 20 feet; Surf. Elev. 0 to -19.

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Painesville FUSRAP Site
USACE - Buffalo District
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Painesville, Ohio

Soil Boring IAA-SB0012

(Page 1 of 1)

Painesville Site IAA	: SB0012
Start Date	: 09/14/00
End Date	: 09/14/00
Northing Coord.	: 232812.40 State Plane
Easting Coord.	: 704945.57 Meters NAD 83
Total Depth of Boring	: 5.9 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0			(0.0-4.2) FILL MATERIAL - CLAY; ash, brick, some fine to coarse sand; trace gravel to 50mm, angular to subangular; colors: 10YR4/4 dark yellowish brown, 10YR2/1 black, and 10YR3/2 very dark grayish brown.			PVSB0034		
1	-1				Rad gamma BKG cpm			0-4'	1605 Sample PVSB0034 collected 0.0-0.5' bgs for RAD analysis
2	-2	FL							
3	-3				PID 0 ppm			2.6'	
4	-4				Rad gamma BKG cpm				
5	-5	CL		(4.2-5.9) Silty CLAY; trace fine to medium sand; moist; hard; medium plastic; 10YR4/4 dark yellowish brown mottled with 10YR5/8 yellowish brown and 10YR5/1 gray.				4-6'	
6	-6			Bottom of Boring @ 5.9' bgs.	PID 0 ppm			1.9'	
7	-7								
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 300,000 cpm
16	-16								1550 Begin Drilling 1610 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
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Painesville, Ohio

Soil Boring IAA-SB0013

(Page 1 of 1)

Painesville Site IAA	: SB0013
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232818.29 State Plane
Easting Coord.	: 705003.87 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-1.5) FILL MATERIAL - Silty CLAY; trace gravel to 15mm, well rounded to subrounded; some fine to coarse sand; dry; hard; non-plastic; 10YR2/1 black.	Rad gamma >24000 cpm at 0.5' bgs		PVSB0037		0833 Sample PVSB0037 collected 0.0-1.0' bgs for RAD, TAL, & TCL analyses
1	-1							0-4'	
2	-2	CL		(1.5-6.0) Silty CLAY; trace fine to medium sand; trace gravel to 10mm, subangular; moist; very stiff; slightly plastic; 10YR5/4 yellowish brown mottled with 10YR5/8 yellowish brown and 10YR5/2 grayish brown.					
3	-3				PID 0 ppm			1.8'	
4	-4				Rad gamma <BKG cpm			4-6'	
5	-5				PID 0 ppm			2.0'	
6	-6	CL		(6.0-8.0) Same as above, Shelby tube sample collected.	Rad gamma <BKG cpm			6-8'	
7	-7				PID 0 ppm	PVSB0038		2.0'	0837 Sample PVSB0038 collected 6.0-8.0' bgs for Geotechnical
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 15000 cpm
16	-16								0815 Begin Drilling 0841 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
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Painesville, Ohio

Soil Boring IAA-SB0014

(Page 1 of 1)

Painesville Site IAA	: SB0014
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232811.53 State Plane
Easting Coord.	: 705005.03 Meters NAD 83
Total Depth of Boring	: 9.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.3) FILL MATERIAL - Pea gravel; some fine to very coarse sand; dry; dense; non-plastic; 10YR7/3 very pale brown.	Rad gamma <BKG cpm				
1	-1	CL		(0.3-0.8) CLAY; trace fine sand; trace gravel to 35mm, subangular; dry to moist; medium stiff; slightly plastic; 10YR5/2 grayish brown.				0-4'	
2	-2								
3	-3	CL		(0.8-5.9) Same as above.	PID 0 ppm			0.8'	
4	-4								
5	-5				Rad gamma <BKG cpm			4-8'	
6	-6	CL		(5.9-7.4) CLAY; trace fine sand; trace fine gravel to 8mm, subangular; moist; very stiff; medium plastic; 10YR5/4 yellowish brown mottled with 10YR5/8 yellowish brown and 10YR5/1 gray.			PVSB0040		0905 Sample PVSB0040 collected 5.9-7.4' bgs for RAD analysis
7	-7				PID 0 ppm			3.4'	
8	-8			(7.4-8.0) No recovery	Rad gamma 1/2 BKG cpm	PVSB0041		8-10'	0911 Sample PVSB0041 collected 8.0-9.5' bgs for Geotechnical. Had to push the shelby tube twice.
9	-9			(8.0-9.5) No description available because of collecting a shelby tube. Bottom of shelby tube had medium sand, well sorted; trace clay; moist; loose; non-plastic; 10YR4/4 yellowish brown.	PID 0 ppm			1.5'	
10	-10			Bottom of Boring @ 9.5' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 15000 cpm
16	-16								0843 Setup in boring 0925 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAA-SB0015

(Page 1 of 1)

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAA	: SB0015
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232823.62 State Plane
Easting Coord.	: 705003.27 Meters NAD 83
Total Depth of Boring	: 4.7 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GC		(0.0-1.0) GRAVEL and SAND; some clay; gravel to 15mm, subangular; sand fine to very coarse; dry to moist; medium dense; slightly plastic; 10YR2/1 balck and 5Y4/2 olive gray.	Rad gamma <BKG cpm		PVSB0043	0-4'	0952 Sample PVSB0043 collected 0.0-1.0' bgs for RAD, TAL, & TCL analyses
1	-1	CL		(1.0-4.5) CLAY; trace gravel to 15mm, subangular; coal and ash; moist; soft; medium plastic; 5Y4/2 olive gray mottled with 10YR5/6 yellowish brown and 10YR2/1 black; large gravel to 40mm, subangular at 4.5' bgs.	PID 0 ppm			1.8'	
2	-2								
3	-3								
4	-4	CL		(4.5-4.7) CLAY; trace fine sand; trace gravel to 10mm, subangular; moist; stiff; medium plastic; 10YR5/4 yellowish brown mottled with 10YR5/8 yellowish brown and 10YR5/1 gray.	Rad gamma <BKG cpm			4-8'	
5	-5			Bottom of Boring @ 4.7' bgs.	PID 0 ppm			0.7	
6	-6								
7	-7								
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 15000 cpm
16	-16								0936 Setup in boring 0955 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
USACE - Buffalo District
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Painesville, Ohio

Soil Boring IAA-SB0016

(Page 1 of 1)

Painesville Site IAA	: SB0016
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232824.52 State Plane
Easting Coord.	: 705006.28 Meters NAD 83
Total Depth of Boring	: 6.1 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL		(0.0-4.5) CLAY; some fine to very coarse sand; trace gravel to 10mm, subangular; moist to dry; medium stiff; medium plastic; 10YR5/3 brown mottled with 10YR5/6 yellowish brown, 10YR5/2 grayish brown and 10YR5/1 gray.	Rad gamma <BKG cpm		PVSB0046	0-4'	0952 Sample PVSB0046 collected 0.0-1.0' bgs for RAD analysis
1	-1								
2	-2								
3	-3				PID 0 ppm			1.5'	
4	-4								
5	-5	CL		(4.5-6.1) Silty CLAY; trace fine sand; dry to moist; very stiff;very slightly plastic; 10YR5/4 yellowish brown with 10YR4/6 dark yellowish brown horizontal layers.	Rad gamma =BKG cpm			4-8' 1st 0.2'	
6	-6			Bottom of Boring @ 6.1' bgs.					
7	-7				PID 0.3 ppm			4-8' 2nd 2.1'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 15000 cpm
16	-16								0959 Setup in boring 1036 Finish drilling
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville, Ohio

Soil Boring IAA-SB0017

(Page 1 of 1)

Painesville Site IAA	: SB0017
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232843.35 State Plane
Easting Coord.	: 705001.01 Meters NAD 83
Total Depth of Boring	: 6.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0			Asphalt on surface					
		CL		(0.2-.75) CLAY; trace fine sand; moist; soft; plastic; 10YR2/1 black; Geofabric material found within interval.	Rad gamma =BKG cpm		PVSB0049		1313 Sample PVSB0049 collected 0.0-1.0' bgs for RAD, TAL, & TCL analyses
1	-1							0-4'	
2	-2			(.75-6.5) CLAY; trace fine sand; moist; medium stiff; plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/4 yellowish brown and 10YR5/1 gray.					
3	-3				PID 0 ppm			1.6'	
4	-4	CL							
5	-5				Rad gamma <BKG cpm			4-8'	
6	-6								
7	-7			Bottom of Boring @ 6.5' bgs.	PID 0 ppm			2.5'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 7000 cpm
16	-16								1300 Begin drilling 1315 Finish drilling
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
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Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0018

(Page 1 of 1)

Painesville Site IAA	: SB0018
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232843.44 State Plane
Easting Coord.	: 704994.05 Meters NAD 83
Total Depth of Boring	: 6.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0								
1	-1	ML		(0.0-1.75) SILT; some fine to medium sand; trace gravel to 15mm, subrounded; moist; dense; non-plastic; 10YR3/3 dark brown.	Rad gamma 8000 cpm			0-4'	
2	-2			Geofabric material at 1.75' bgs			PVSB0052		1338 Sample PVSB0052 collected 1.75-2.5' bgs for RAD analysis
3	-3	CL		(1.75-4.0) CLAY; trace fine sand; trace gravel to 10mm, subangular;dry to moist; plastic; 10YR2/1 black and 10YR3/1 very dark gray.	PID 0 ppm			2.5'	
4	-4								
5	-5	CL		(4.0-6.0) CLAY; trace fine to medium sand; moist; medium stiff; plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/1 gray and 10YR5/4 yellowish brown.	Rad gamma 8000 cpm			4-8'	
6	-6			Bottom of Boring @ 6.0' bgs.					
7	-7				PID 0 ppm			2.0'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 7000 cpm
16	-16								1320 Begin drilling 1338 Finish drilling
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
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Painesville, Ohio

Soil Boring IAA-SB0019

(Page 1 of 1)

Painesville Site IAA	: SB0019
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232863.58 State Plane
Easting Coord.	: 705004.54 Meters NAD 83
Total Depth of Boring	: 14.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GC		(0.0-0.5) GRAVEL; some fine to very coarse sand; trace clay; dry; medium dense; 10YR6/3 pale brown.	Rad 10000 > bkg cpm 6-12"				
1	-1	FL		(0.5-1.5) FILL MATERIAL - Ash, cinders, brick pieces; dry; loose; non-plastic; 10YR2/1 black.			PVSB0055	0-4'	1407 Sample PVSB0055 collected 0.5-1.5' bgs for RAD analysis
2	-2			(1.5-4.0) No recovery					
3	-3				PID 0 ppm			1.5'	
4	-4	ML		(4.0-4.5) SILT; trace fine sand; trace clay; trace gravel to 30mm, subangular; moist; very dense; non-plastic; 10YR5/3 brown mottled with 10YR5/6 yellowish brown and 5Y5/2 olive gray.					
5	-5	CL		(4.5-5.1) CLAY; trace gravel to 10mm, subrounded to rounded; moist; very soft; plastic; 5Y4/1 dark gray.	Rad gamma = bkg cpm			4-8'	
		CL		(5.1-5.3) Organic Material and CLAY; trace fine sand; moist; very soft; non-plastic; 5Y2.5/1 black.					
6	-6			(5.3-8.0) No recovery					
7	-7				PID 0 ppm			1.3'	
8	-8	CL		(8.0-9.25) Clay as 4.5-5.' bgs interval.	Rad gamma = bkg cpm				
9	-9	CL		(9.25-9.75) CLAY; trace fine sand; moist; very stiff; plastic; 10YR5/6 yellowish brown mottled with 10YR5/1 gray and 10YR5/8 yellowish brown.				8-12'	
10	-10								
11	-11			(9.75-14.0) Same as above	PID 0 ppm			1.75'	
12	-12	CL			Rad gamma = bkg cpm			12-14'	
13	-13				PID 0 ppm	PVSB0056		2.0'	1409 Sample PVSB0056 collected 12.0-14.0' bgs for Geotechnical
14	-14			Bottom of Boring @ 14.0' bgs.					
15	-15								RAD BKG gamma = 8000 cpm
16	-16								1349 Begin drilling 1412 Finish drilling
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
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Painesville, Ohio

Soil Boring IAA-SB0020

(Page 1 of 1)

Painesville Site IAA	: SB0020
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232864.07 State Plane
Easting Coord.	: 705010.89 Meters NAD 83
Total Depth of Boring	: 5.75 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.5) FILL MATERIAL - Concrete, ash, rock, coal, brick; some clay; trace fine to coarse sand; 10YR2/1 black and 10YR3/2 very dark grayish brown.			PVSB0058		
1	-1				Rad gamma =bkg cpm			0-4'	1441 Sample PVSB0058 collected 0.0-1.0' bgs for RAD analysis
2	-2	CL		(0.5-5.0) CLAY; trace fine to medium sand; trace gravel to 10mm; moist; stiff; plastic; 10YR5/4 yellowish brown mottled with 10YR5/8 yellowish brown.					
3	-3				PID 0 ppm			1.75'	
4	-4								
5	-5	CL		(5.0-5.75) CLAY and Organic Material; trace gravel to 10mm, subrounded; moist; very soft; plastic.	Rad gamma =bkg cpm			4-8'	
6	-6			Bottom of Boring @ 5.75' bgs.					
7	-7				PID 0 ppm			1.75'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 8000 cpm
16	-16								1418 Begin drilling 1449 Finish drilling
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0021

(Page 1 of 1)

Painesville Site IAA	: SB0021
Start Date	: 09/18/00
End Date	: 09/18/00
Northing Coord.	: 232873.74 State Plane
Easting Coord.	: 704993.15 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.5) Clayey SILT	Rad gamma 9000 - 11000 cpm		PVSB0061 PVSB9004	0-4'	0958 Samples PVSB0061 and duplicate PVSB9004 collected 0.0-1.0' bgs for RAD analysis
1	-1	FL		(0.5-4.0) FILL MATERIAL - SAND; fine-coarse; loose; predominately coal and slag; dry; black.					
2	-2								
3	-3				PID 0 ppm			3.7'	
4	-4	CL		(4.0-8.0) Silty CLAY; 10% gravel; moist; stiff; high plasticity; 10YR4/1 dark gray.	Rad gamma 9000 - 11000 cpm			4-8'	Sample tube was pushed twice to get sufficient recovery.
5	-5								
6	-6								
7	-7				PID 0 ppm			3.5'	
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 10,000 cpm
16	-16								0930 Set up on boring 1002 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0022

Painesville Site IAA	: SB0022
Start Date	: 09/18/00
End Date	: 09/18/00
Northing Coord.	: 232881.46 State Plane
Easting Coord.	: 704994.00 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.5) Clayey SILT; 10% fine to medium sand; roots; low plasticity; 10Yr4/1 very dark gray.	Rad gamma 9000 - 11000 cpm		PVSB0064		1018 Sample PVSB0064 collected 0.0-1.0' bgs for RAD analysis
1	-1	FL						0-4'	
2	-2	GM		(0.5-1.4) FILL MATERIAL - SAND; fine-coarse; loose; predominately coal and brick; dry; black.					
3	-3			(1.4-2.1) GRAVEL; 25% silt/clay; wet; loose.	PID 0 ppm			3.0'	
4	-4	CL		(2.1-6.5) Silty CLAY; 10% medium gravel; moist; high plasticity; 10YR3/1 very dark gray.					
5	-5				Rad gamma 9000 - 11000 cpm			4-8'	
6	-6								
7	-7	CL		(6.5-8.0) Silty CLAY; 10% medium gravel; moist; low plasticity; 10YR5/6 yellowish brown with gray mottling.	PID 0 ppm			3.5'	
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 12,000 cpm
16	-16								1002 Begin boring 1020 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0023

(Page 1 of 1)

Painesville Site IAA	: SB0023
Start Date	: 09/18/00
End Date	: 09/18/00
Northing Coord.	: 232892.32 State Plane
Easting Coord.	: 705004.00 Meters NAD 83
Total Depth of Boring	: 6.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.9) FILL MATERIAL - Sandy SILT; brick and coal fragments; dry; loose; 10YR3/1 very dark gray.	Rad gamma 8000 - 10000 cpm		PVSB0167 PVSB9503		1058 Sample PVSB0167 collected 0.0-1.0' bgs for RAD, TAL, & TCL analyses Sample PVSB9503 collected as a RAD split.
1	-1	CL		(0.9-3.8) Silty CLAY; 10% medium gravel; moist; very stiff; low plasticity; 10YR5/1 gray.				0-4'	
2	-2								
3	-3				PID 0 ppm			2.6'	
4	-4	CL		(3.8-6.0) Silty CLAY; 10% medium gravel; moist; stiff to very stiff; medium plasticity; 2.5YR4/4 olive brown.	Rad gamma 8000 - 10000 cpm				
5	-5							4-8'	
6	-6			(6.0-8.0) Bottom of boring 6.0' bgs. *hammer on Geoprobe broke and could not acquire the last 2 feet.					
7	-7				PID 0 ppm			1.75'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 9,000 cpm
16	-16								1021 Set up on boring 1100 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0024

Painesville Site IAA	: SB0024
Start Date	: 09/18/00
End Date	: 09/18/00
Northing Coord.	: 232865.72 State Plane
Easting Coord.	: 704983.78 Meters NAD 83
Total Depth of Boring	: 1.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0								
1	-1	ML		(0.0-1.5) Clayey SILT; 10% fine to medium sand; dry; non-plastic; 10YR4/3 brown.	Rad gamma 9000 cpm PID 0 ppm		PVSB0070	0-4' 1.5'	1227 Sample PVSB0070 collected 0.0-1.0' bgs for RAD analysis
2	-2			Auger refusal at 1.5' bgs due to bricks and large cobbles.					Three borings were attempted but refusal encountered in all three at 1.5' bgs.
3	-3								
4	-4								
5	-5								
6	-6								
7	-7								
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 10,000 - 12,000 cpm
16	-16								1203 Set up on boring 1220 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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12-20-2000

Soil Boring IAA-SB0025

(Page 1 of 1)

SAIC — An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAA	: SB0025
Start Date	: 09/18/00
End Date	: 09/18/00
Northing Coord.	: 232911.95 State Plane
Easting Coord.	: 704992.32 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL		(0.0-0.8) Silty CLAY; 10% medium gravel; dry; non-plastic; 10YR6/4 light yellowish brown.	Rad gamma 7000 - 8000 cpm				Sample PVSB0073 collected 0.5-1.5' bgs for RAD, TAL, & TCL analyses
1	-1	FL		(0.8-1.2) Hard metallic substance like graphite silver/gray streak.			PVSB0073	0-4'	
2	-2	CL		(1.2-6.9) Clayey SILT; 10% fine to medium gravel; moist; very stiff to hard; low to medium plasticity; 10YR6/4 light yellowish brown.					
3	-3				PID 0 ppm			3.6'	
4	-4								
5	-5				Rad gamma 7000 - 8000 cpm			4-8'	
6	-6								
7	-7			(6.9-8.0) No sample recovery	PID 0 ppm	PVSB0073		2.9'	Sample PVSB0073 collected 6.0-8.0' bgs for geotechnical
8	-8			Bottom of boring at 8.0' bgs.					Two borings were punched to obtain required sample volume. Geotech sample collected in 2nd boring.
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 8,000 - 9,000 cpm
16	-16								1415 Set up on boring 1445 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAA-SB0026

(Page 1 of 1)

Painesville Site IAA	: SB0026
Start Date	: 09/18/00
End Date	: 09/18/00
Northing Coord.	: 232870.94 State Plane
Easting Coord.	: 704976.08 Meters NAD 83
Total Depth of Boring	: 6.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.6) Clayey SILT; 10% gravel; roots; dry; non-plastic; 10YR5/6 yellowish brown.					1520 Samples PVSB0076 and PVSB9005 collected 0.5-1.5' bgs for RAD analysis
1	-1	FL		(0.6-2.0) FILL MATERIAL - SAND and GRAVEL, fine to coarse; some slag and coal fragments; dry; loose; 10YR2/1 black.	Rad gamma 9400 cpm		PVSB0076	0-4'	Gamma reading of 9,400 cpm was detected in the 0.5-2.0' interval.
2	-2	CL		(2.0-6.0) Silty CLAY; 10% fine to medium gravel; moist; very stiff; 10YR6/4 light yellowish brown.					
3	-3				PID 0 ppm			3.0'	
4	-4								
5	-5				Rad gamma 8500 cpm			4-8'	
6	-6			(6.0-8.0) No sample description due to poor recovery.					
7	-7				PID 0 ppm			1.8'	
8	-8			Bottom of boring at 6.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 8,500 cpm
16	-16								1500 Set up on boring 1530 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAA-SB0027

(Page 1 of 1)

Painesville Site IAA	: SB0027
Start Date	: 09/18/00
End Date	: 09/18/00
Northing Coord.	: 232848.96 State Plane
Easting Coord.	: 704971.11 Meters NAD 83
Total Depth of Boring	: 10.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.5) Clayey SILT; 20% gravel; roots; dry; 10YR3/2 very dark grayish brown.					
1	-1	ML		(0.5-1.5) SILT; 10% medium gravel; dry; loose; non-plastic; 10YR5/3 brown.	Rad gamma 8000 - 9000 cpm		PVSB0079 PVSB9007	0-4'	1553 Samples PVSB0079 and PVSB9007 collected 0.5-1.5' bgs for RAD analysis
2	-2			(1.5-3.5) No description due to porr sample recovery.					
3	-3				PID 0 ppm			1.7'	
4	-4			(3.5- 8.0) Silty CLAY; 10% fine to medium gravel; moist; very stiff; low plasticity; 10YR5/6 yellowish brown.					
5	-5				Rad gamma 8000 - 9000 cpm			4-8'	Boring SB0027 was drilled twice from 0-8' bgs due to poor sample recovery.
6	-6	CL							
7	-7				PID 0 ppm			3.2'	
8	-8			(8.0-10.0) No sample description due to collection of shelby tube.					
9	-9					PVSB0079			
10	-10			Bottom of boring at 10.0' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 9,000 - 10,000 cpm
16	-16								1535 Set up on boring 1555 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
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Soil Boring IAA-SB0028

(Page 1 of 1)

Painesville Site IAA	: SB0028
Start Date	: 09/18/00
End Date	: 09/18/00
Northing Coord.	: 232829.15 State Plane
Easting Coord.	: 704976.21 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25'' OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.4) Clayey SILT; 25% fine to medium gravel; roots; dry; loose; 10YR4/2 dark grayish brown.					
1	-1	FL		(0.4-1.2) FILL MATERIAL - SAND; contains brick, coal and slag; dry; 10YR2/1 black.	Rad gamma 16000 - 18000 cpm		PVSB0082	0-4'	1648 Sample PVSB0082 collected 0.5-1.5' bgs for RAD analysis
2	-2								Hit obstruction at 2' bgs and had to move rig and redrill boring.
3	-3	CL		(1.2-6.0) Silty CLAY; very stiff; non-plastic; 10YR3/1 very dark gray.	PID 0 ppm			3.2'	
4	-4								
5	-5				Rad gamma 16000 - 18000 cpm			4-8'	
6	-6								
7	-7	CL		(6.0-8.0) Silty CLAY; 10% medium gravel; moist; soft; medium plasticity; 10YR5/1 gray.	PID 0 ppm			3.5'	
8	-8			Bottom of boring at 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 19,000 - 20,000 cpm
16	-16								1600 Set up on boring 1650 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAA-SB0029

(Page 1 of 1)

Painesville Site IAA : SB0029
Start Date : 09/18/00
End Date : 09/18/00
Northing Coord. : 232801.99 State Plane
Easting Coord. : 704985.78 Meters NAD 83
Total Depth of Boring : 10.0 feet

Drilling Company : Double J Drilling
Driller : Don Malone
Designation of Drill : Diedrich
Type of Drill Rig : Direct Push Technology
Geologist : Joe Schultheis
Depth to Bedrock : Not Encountered
Depth Drilled Into Rock: NA
Borehole Diameter : 2.5 inches
Sampling Equipment : 4' Sampling Tube 2.25" OD
SS Bowl & Spoon : Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.3) Clayey SILT; 10% medium gravel; moist; loose; 10YR3/2 very dark grayish brown.					
		SP		(0.3-1.0) SAND, fine to coarse; 20% gravel; dry; loose.	Rad gamma 18000 - 20000 cpm				Sample PVSB0085 collected 0.5-1.5' bgs for RAD analysis
1	-1						PVSB0085	0-4'	
2	-2	SP		(1.0-2.5) SAND, fine to medium; 25% fine to medium gravel; moist; loose; 10YR4/4 dark yellowish brown.					
3	-3	CL		(2.5-8.0) Silty CLAY; 10% medium gravel; moist; soft; medium plasticity; 10YR3/1 very dark gray.	PID 0 ppm			3.4'	
4	-4								
5	-5				Rad gamma 18000 - 20000 cpm			4-8'	
6	-6								
7	-7				PID 0 ppm			1.9'	
8	-8			(8.0-10.0) No sample description due to collection of shelby tube.					
9	-9					PVSB0085			Sample PVSB0085 collected 6.0-8.0' bgs for geotechnical
10	-10			Bottom of boring at 10.0' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 20,000 cpm
16	-16								1650 Set up on boring 1718 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
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Soil Boring IAA-SB0030

(Page 1 of 1)

Painesville Site IAA : SB0030
Start Date : 09/19/00
End Date : 09/19/00
Northing Coord. : 232810.88 State Plane
Easting Coord. : 704989.90 Meters NAD 83
Total Depth of Boring : 8.0 feet

Drilling Company : Double J Drilling
Driller : Don Malone
Designation of Drill : Diedrich
Type of Drill Rig : Direct Push Technology
Geologist : Joe Schultheis
Depth to Bedrock : Not Encountered
Depth Drilled Into Rock: NA
Borehole Diameter : 2.5 inches
Sampling Equipment : 4' Sampling Tube 2.25'' OD
SS Bowl & Spoon : Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.4) Asphalt and gravel base					
1	-1	CL		(0.4-4.5) Silty CLAY; 20% fine to medium gravel; moist; very stiff; 10YR3/4 dark yellowish brown.	Rad gamma 8500 cpm		PVSB0085	0-4'	0822 Sample PVSB0088 collected 0.5-1.5' bgs for RAD, TAL, & TCL analyses
2	-2								
3	-3				PID 107 ppm 0.5-1.0' bgs			2.9'	
4	-4								
5	-5	GC		(4.5-5.0) Gravelly CLAY; wet; soft; high plasticity; 10YR4/1 dark gray.	Rad gamma 8500 cpm			4-8'	
6	-6	CL		(5.0-7.0) Silty CLAY; moist; firm; high plasticity; 10YR5/4 yellowish brown.					
7	-7			(7.0-8.0) No sample description due to poor recovery.	PID 0 ppm			2.0'	
8	-8			Bottom of boring at 8.0' bgs.					
9	-9								Sample PVSB0085 collected 6.0-8.0' bgs for geotechnical
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 7,500 cpm
16	-16								0800 Set up on boring 0833 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAA-SB0031

Painesville Site IAA	: SB0031
Start Date	: 09/19/00
End Date	: 09/19/00
Northing Coord.	: 232816.93 State Plane
Easting Coord.	: 704996.05 Meters NAD 83
Total Depth of Boring	: 10.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.4) Asphalt and gravel base	Rad gamma 10000 - 11000 cpm			0-4'	Slightly elevated gamma in 1.0-2.0' bgs section.
1	-1	ML		(0.4-1.5) Sandy SILT; 20% clay; 10% medium gravel; non-plastic; 10YR4/3 brown.	Rad gamma 18000 cpm		PVSB0091		0840 Sample PVSB0091 collected 1.0-2.0' bgs for RAD, TAL, & TCL analyses
2	-2	SM		(1.5-2.0) Silty SAND; 25% fine to medium gravel; 5% clay; moist; 10YR3/1 very dark gray.					
3	-3	CL		(2.0-4.5) Silty CLAY; 25% fine to medium gravel; moist; very stiff; medium plasticity; 10YR5/6 yellowish brown.	PID 0 ppm			2.5'	
4	-4								
5	-5	CL		(4.5-8.0) Silty CLAY; 10% medium gravel; moist; soft; high plasticity; 10YR5/4 yellowish brown.	Rad gamma 10000 - 11000 cpm			4-8'	
6	-6								
7	-7				PID 0 ppm			3.7'	
8	-8			(8.0-10.0) No sample description due to collection of shelby tube.				8-10'	
9	-9					PVSB0091		1.0'	0840 Sample PVSB0091 collected 8.0-10.0' bgs for geotechnical
10	-10			Bottom of boring at 10.0' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 11,000-12,000 cpm
16	-16								0835 Set up on boring 0900 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAA-SB0032

Painesville Site IAA	: SB0032
Start Date	: 09/19/00
End Date	: 09/19/00
Northing Coord.	: 232813.42 State Plane
Easting Coord.	: 704959.44 Meters NAD 83
Total Depth of Boring	: 10.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.3) Clayey SILT; 10% gravel; roots; dry; loose; non-plastic; 10YR5/4 yellowish brown.	Rad gamma 8000 - 10000 cpm			0-4'	
1	-1	ML		(0.3-2.5) Sandy SILT; 25% fine to medium gravel; dry; loose; non-plastic; 10YR4/3 brown.			PVSB0094		0920 Sample PVSB0094 collected 0.5-1.5' bgs for RAD, TAL, & TCL analyses and RAD MS/MSD
2	-2								
3	-3	CL		(2.5-5.0) Silty CLAY; 10% fine to medium gravel; moist; very stiff; low plasticity; 10YR3/2 very dark grayish brown.	PID 0 ppm			3.0'	
4	-4								
5	-5	CL		(5.0-8.0) Silty CLAY; 10% fine to medium gravel; moist; hard; low plasticity; 10YR5/3 brown.	Rad gamma 8000 - 10000 cpm			4-8'	
6	-6								
7	-7				PID 0 ppm			3.1'	
8	-8			(8.0-10.0) No sample description due to collection of shelby tube.					
9	-9					PVSB0094			Sample PVSB0094 collected 8.0-10.0' bgs for geotech.
10	-10			Bottom of boring at 10.0' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 12,000-13,000 cpm
16	-16								0905 Set up on boring 0935 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville, Ohio

Soil Boring IAA-SB0033

Painesville Site IAA	: SB0033
Start Date	: 09/19/00
End Date	: 09/19/00
Northing Coord.	: 232803.58 State Plane
Easting Coord.	: 704926.29 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25'' OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.3) SILT; roots; 10% gravel; dry; loose; non-plastic; 10YR4/2 dark grayish brown.	Rad gamma 9000 - 10000 cpm			0-4'	
1	-1	CL		(0.3-2.8) Silty CLAY; 25% fine to medium gravel; dry; stiff; non-plastic; 10YR5/4 yellowish brown.			PVSB0097		0955 Sample PVSB0097 collected 0.5-1.5' bgs for RAD, TAL, & TCL analyses and full suite MS/MSD
2	-2								
3	-3	CL		(2.8-6.0) Silty CLAY; 10% fine to medium sand; 10% medium gravel; moist; stiff; low plasticity; 10YR4/4 dark yellowish brown.	PID 0 ppm			3.3'	
4	-4								
5	-5				Rad gamma 9000 - 10000 cpm			4-8'	
6	-6	CL		(6.0-8.0) Silty CLAY; 10% medium gravel; moist; very stiff; medium plasticity; 10YR5/3 brown.					
7	-7				PID 0 ppm			2.8'	
8	-8			Bottom of boring at 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 11,000-12,000 cpm
16	-16								0940 Set up on boring 1000 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
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Soil Boring IAA-SB0034

(Page 1 of 1)

Painesville Site IAA	: SB0034
Start Date	: 09/19/00
End Date	: 09/19/00
Northing Coord.	: 232812.55 State Plane
Easting Coord.	: 704946.34 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL		(0.0-0.8) Silty CLAY; 10% medium gravel; moist; very stiff; low plasticity; 10YR5/3 brown.	Rad gamma 11000 - 13000 cpm		PVSB0100 PVSB9505	0-4'	
1	-1	FL		(0.8-1.2) FILL MATERIAL - Silty SAND, fine to coarse; predominence of coal fragments; loose; black.					1053 Samples PVSB0100 and PVSB9505 collected 0.5-1.5' bgs for RAD, TAL, & TCL analyses.
2	-2	FL		(1.2-3.0) FILL MATERIAL - Sandy CLAY; 20% medium gravel; 5% coal; some slag; moist; low plasticity; 10YR3/1 very dark gray.					
3	-3				PID 0 ppm			3.1'	
4	-4	CL		(3.0-5.5) Silty CLAY; 10% fine to medium gravel; moist; very stiff; low plasticity; 10YR5/6 yellowish brown.					
5	-5				Rad gamma 11000 - 13000 cpm			4-8'	
6	-6			(5.5-8.0) No sample recovery					
7	-7				PID 0 ppm			2.0'	
8	-8			Bottom of boring at 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 20,000 cpm
16	-16								1025 Set up on boring 1100 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville, Ohio

Soil Boring IAA-SB0035

Painesville Site IAA	: SB0035
Start Date	: 09/19/00
End Date	: 09/19/00
Northing Coord.	: 232821.90 State Plane
Easting Coord.	: 705016.32 Meters NAD 83
Total Depth of Boring	: 10.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.3) Asphalt with gravel base.	Rad gamma 7000 - 9000 cpm			0-4'	
1	-1	CL		(0.3-3.2) Silty CLAY; 10% fine to medium gravel; moist; very stiff; low plasticity; 10YR4/6 dark yellowish brown mottled with 10YR5/1 gray.			PVSB0103		1145 Sample PVSB0103 collected 0.5-1.5' bgs for RAD analysis.
2	-2								
3	-3	CL		(3.2-8.0) Silty CLAY; 10% medium gravel; moist; stiff; medium plasticity; 10YR5/3 brown.	PID 0 ppm			3.2'	
4	-4								
5	-5				Rad gamma 7000 - 9000 cpm			4-8'	
6	-6								
7	-7				PID 0 ppm			3.9'	
8	-8			(8.0-10.0) No description available - sample acquired by pushing a shelby tube.					
9	-9					PVSB0103			1148 Sample PVSB0103 coolected 8.0-10.0' bgs for geotech.
10	-10			Bottom of boring at 8.0' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 21,000-30,000 cpm
16	-16								1105 Set up on boring 1150 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0036

Painesville Site IAA	: SB0036
Start Date	: 09/19/00
End Date	: 09/19/00
Northing Coord.	: 232912.79 State Plane
Easting Coord.	: 704993.78 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.5) Clayey SILT; 20% fine to medium gravel; moist; loose; non-plastic; 10YR3/2 very dark grayish brown.	Rad gamma 12000 cpm		PVSB0106 PVSB9506	0-4'	
1	-1	CL		(0.5-6.3) Silty CLAY; 10% fine to medium gravel; moist; very stiff; low plasticity; 10YR4/6 dark yellowish brown.					1418 Samples PVSB0106 and PVSB9506 collected 0.5-1.5' bgs for RAD analysis.
2	-2								
3	-3				PID 0 ppm			3.45'	
4	-4								
5	-5				Rad gamma 12000 cpm			4-8'	
6	-6								
7	-7	CL		(6.3-8.0) Silty CLAY; 10% fine sand; moist; very stiff; low plasticity; 10YR5/3 brown.	PID 0 ppm			3.6'	
8	-8			Bottom of boring at 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 25,000-30,000 cpm
16	-16								1400 Set up on boring 1420 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAA-SB0037

Painesville Site IAA	: SB0037
Start Date	: 09/20/00
End Date	: 09/20/00
Northing Coord.	: 232843.43 State Plane
Easting Coord.	: 704983.19 Meters NAD 83
Total Depth of Boring	: 1.55 feet

Drilling Company	: SAIC
Driller	: Pete Ferron
Designation of Drill	: Hand Auger
Type of Drill Rig	: Hand Auger
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3.5 inches
Sampling Equipment	: 3.5" OD Stainless Steel
SS Bowl & Spoon	: Bucket Auger

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.9) SILT; 15% fine to medium sand; 20% gravel; moist; loose; non-plastic; 10YR4/3 brown.	Rad gamma 12000 cpm PID 0 ppm				
1	-1	CL		(0.9-1.55) Silty CLAY; 25% fine to medium gravel; 10% fine to medium sand; moist; stiff; medium plasticity; 10YR4/6 dark yellowish brown. (Synthetic liner at 1.0' bgs).	Rad gamma 13000 cpm PID 0.2 ppm		PVSB0206 PVSB9507		Samples PVSB0206 and PVSB9507 collected 0.9-1.5' bgs for RAD, TAL, & TCL analyses. Rad only for PVSB9507, split sample.
2	-2			Auger refusal at 1.55' bgs.					Three holes were hand augered, but encountered refusal between 1.3 and 1.55' bgs.
3	-3								Soil from 0.9-1.5 was discolored, had slightly higher gamma reading and PID response of 0.2 ppm.
4	-4								
5	-5								RAD BKG gamma = 10,000-12,000 cpm
6	-6								0802 Set up on boring 0830 Finish boring
7	-7								
8	-8								All colors from Munsell Soil Color Chart 1992 Revised Edition
9	-9								
10									

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Soil Boring IAA-SB0038

(Page 1 of 1)

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAA	: SB0038
Start Date	:
End Date	: 09/21/00
Northing Coord.	: 232833.22 State Plane
Easting Coord.	: 704984.44 Meters NAD 83
Total Depth of Boring	: 2.0 feet

Drilling Company	: SAIC
Driller	: Pete Ferron
Designation of Drill	: Hand Auger
Type of Drill Rig	: Hand Auger
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3.5 inches
Sampling Equipment	: 3.5" OD Stainless Steel
SS Bowl & Spoon	: Bucket Auger

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML		(0.0-0.9) SILT; 15% fine to medium sand; 20% medium gravel; moist; non-plastic; 10YR3/3 dark brown.	Rad gamma 200,000 cpm Rad gamma 40000 cpm		PVSB0209		1135 Sample PVSB0209 collected 0.0-0.5' bgs for RAD analysis.
1	-1	FL		(0.9-2.0) Same as above but contains coal fragments and color change to 10YR4/3 brown.	Rad gamma 40000 cpm				PID response on soil was 0.0 ppm Gamma scan was also performed downhole in 6 inch increments, but all readings were 35,000 to 40,000 cpm
2	-2			Auger refusal at 2.0' bgs due to large cobbles, bricks, and chunks of coal.					RAD scan on sample inside container was >100,000 cpm
3	-3								
4	-4								
5	-5								RAD BKG gamma = 35,000-40,000 cpm
6	-6								1115 Set up on boring 1140 Finish boring
7	-7								
8	-8								All colors from Munsell Soil Color Chart 1992 Revised Edition
9	-9								
10									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAB-SB0001

Painesville Site IAB	: SB0001
Start Date	: 09/20/00
End Date	: 09/20/00
Northing Coord.	: 232903.54 State Plane
Easting Coord.	: 705249.81 Meters NAD 83
Total Depth of Boring	: 6.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
2" OD Split Spoon 2'	: 3" OD Split Spoon 2' Long

Depth in feet	Surf. Elev.	USCS	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	ML	(0.0-0.5) Clayey SILT; 20% coarse gravel; moist; non-plastic; 10YR3/2 very dark grayish brown.	PID 0.1 ppm 0.5-1.0' bgs		PVSB0221	0-2' 1.5'	1455 Sample PVSB0221 collected 0.5-1.5' bgs for RAD, TAL, & TCL analyses. Split spoon driven twice from 0.0-2.0' bgs to obtain sufficient sample volume.
1	-1	GM	(0.5-4.2) GRAVEL; 30% fine to coarse sand; 10% silt; dry; loose.	PID 0 ppm all the rest			2-4' 1.4'	
2	-2							
3	-3							
4	-4	ML	(4.2-5.0) Clayey SILT; 10% medium gravel; moist; very stiff; non-plastic; 10YR4/4 dark yellowish brown.	Rad gamma 9000 - 10000 cpm on all scans			4-6' 1.5'	
5	-5	FL	(5.0-6.0) Silty CLAY; some brick and wood; very stiff; low plasticity; 10YR3.1 very dark gray to 10YR2/1 black.					
6	-6		Bottom of boring at 6.0' bgs.					
7	-7							
8	-8							
9	-9							
10	-10							
11	-11							
12	-12							
13	-13							
14	-14							
15	-15							RAD BKG gamma = 50,000 cpm
16	-16							1415 Set up on boring 1500 Finish boring
17	-17							
18	-18							All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19							
20								

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAB-SB0002

Painesville Site IAB	: SB0002
Start Date	: 09/20/00
End Date	: 09/20/00
Northing Coord.	: 232925.60 State Plane
Easting Coord.	: 705231.53 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl and Spoon	: Acetate Liners

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0			(0.0-5.1) Clayey SILT; 10% fine to medium gravel; dry; hard; non-plastic; 10YR6/4 light yellowish brown.	Rad gamma 9000 - 11000 cpm		PVSB0218	0-2.7' *	1315 Sample PVSB0218 collected 0.0-1.0' bgs for RAD, TAL, & TCL analyses.
1	-1								
2	-2				PID 0 ppm			2.5'	* Pushed sampler 0-4' twice to obtain sufficient soil volume for full suite samples.
3	-3	ML							Drive hammer broke and required repairs.
4	-4								
5	-5			(5.1-8.0) No sample recovered below 5.1' bgs.	Rad gamma 9000 - 11000 cpm			4-8'	
6	-6								
7	-7				PID 0 ppm all the rest			1.1'	
8	-8			Bottom of boring at 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 10,500 cpm
16	-16								1300 Set up on boring 1410 Finish boring
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

12-20-2000 c:\Paine\IABSB002.BOR

Soil Boring IAC-SB0001

(Page 1 of 1)

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAC	: SB0001
Start Date	: 09/13/00
End Date	: 09/13/00
Northing Coord.	: 232763.19 State Plane
Easting Coord.	: 705272.52 Meters NAD 83
Total Depth of Boring	: 9.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.5) Concrete steel reinforced.					
1	-1	GC		(0.5-1.0) FILL MATERIAL - GRAVEL BASE: GRAVEL to 15mm, angular; some fine to coarse sand; trace clay; moist; dense; non-plastic; 10YR5/2 grayish brown.	Rad gamma 8800 cpm			0-4'	
2	-2	GP							
3	-3			(1.0-1.6) FILL MATERIAL - GRAVEL BASE: GRAVEL to 25mm, angular to subangular; some fine to coarse sand; moist; dense; non-plastic; 10YR3/1 very dark gray.	PID 0 ppm			1.1'	
4	-4	CL		(1.6-4.0) No recovery.			PVSB0109		1150 Sample PVSB0109 collected 4.0-4.3 bgs for RAD analysis
5	-5			(4.0-4.3) Silty CLAY; appears to be fill material; trace medium sand; trace very fine gravel to 5mm, subangular; moist; stiff; medium plastic; 5Y3/2 dark olive gray mottled with 5Y5/3 olive and 7.5YR5/8 strong brown.	Rad gamma 10000 cpm			4-8'	
6	-6								Attempting to get better recovery from 4-8' interval.
7	-7			(4.3-8.0) No recovery.	PID 0 ppm			0.3'	
8	-8								Native material at 8.0' bgs encountered.
9	-9	ML		(8.0-9.5) Clayey SILT; trace fine to medium sand; trace very fine gravel to 8mm, subangular; dry to moist; hard; slightly plastic; 2.5Y5/4 light olive brown.	Rad gamma 9500 cpm PID 0 ppm			8-9.5' 1.5'	
10	-10			Bottom of Boring @ 9.5' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 9000 cpm
16	-16								
17	-17								1054 Begin drilling 1151 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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12-20-2000

SAIC
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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAC-SB0002

Painesville Site IAC	: SB0002
Start Date	: 09/13/00
End Date	: 09/13/00
Northing Coord.	: 232775.74 State Plane
Easting Coord.	: 705272.57 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.5) Concrete steel reinforced.					
1	-1	FL		(0.5-2.0) FILL MATERIAL - GRAVEL BASE.	Rad gamma 9000 cpm			2-4'	Drive point driven to 2' bgs.
2	-2	CL		(2.0-2.9) CLAY; trace fine sand; piece of metal; dry to moist; very stiff; medium plastic; 5Y4/2 olive gray mottled with 5Y5/2 olive gray and 2.5Y6/8 olive yellow.			PVSB0112		1221 Sample PVSB0112 collected 2.0-2.7 bgs for RAD analysis
3	-3	CL			PID 0 ppm			1.6'	
4	-4	ML		(2.9-3.2) Same as above except becoming siltier.					
5	-5	ML		(3.2-4.8) SILT; some fine sand; moist to wet; medium dense; non-plastic; 5Y5/2 olive gray.	Rad gamma <8000 cpm			4-8'	
6	-6			(4.8-6.5) SILT as above except color is 10YR4/6 dark yellowish brown.					
7	-7	CL		(6.5-8.0) CLAY; trace fine to coarse sand; trace gravel to 8mm, subangular; moist; hard; slightly plastic; 10YR4/4 dark yellowish brown mottled with 10YR5/8 yellowish brown.	PID 0 ppm			4.0'	
8	-8								
9	-9			Bottom of Boring @ 8.0' bgs.					
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 9000 cpm
16	-16								
17	-17								1154 Begin drilling 1220 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAC-SB0003

Painesville Site IAC	: SB0003
Start Date	: 09/14/00
End Date	: 09/14/00
Northing Coord.	: 232765.49 State Plane
Easting Coord.	: 705270.63 Meters NAD 83
Total Depth of Boring	: 1.0 feet

Drilling Company	: SAIC
Driller	: Joe Schultheis
Designation of Drill	: Hand Auger
Type of Drill Rig	: Hand Auger
Geologist	: Brad Richardson
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3.5 inches
Sampling Equipment	: 3.5" OD SS Hand Auger
	: SS Bowl & Spoon

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.5) Gravel fill with Silty CLAY matrix.	Rad gamma 25K 0-0.3'		PVSB0110		1030 Sample PVSB0110 collected 0.0-0.5 bgs for RAD analysis
		GP		(0.5-1.0) All GRAVEL.	Rad gamma 22K 0.3-0.5'				
1	-1			Refusal @ 1.0' bgs.					Surface gamma at 300K cpm. Downhole gamma 0-4" = 400K cpm. Hit refusal with first hole at 0.5' bgs.
2	-2								2nd hole 0.0-0.5 gamma =42K cpm 0.5-1.0 gamma =18-20K cpm downhole gamma 0.5-1.0' = 330K cpm
3	-3								
4	-4								
5	-5								RAD BKG gamma = 9-10K cpm
6	-6								
7	-7								1015 Begin augering 1035 Finish boring
8	-8								All colors from Munsell Soil Color Chart 1992 Revised Edition
9	-9								
10									

SAIC
An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAC-SB0004

(Page 1 of 1)

Painesville Site IAC	: SB0004
Start Date	: 09/14/00
End Date	: 09/14/00
Northing Coord.	: 232749.35 State Plane
Easting Coord.	: 705271.16 Meters NAD 83
Total Depth of Boring	: 1.0 feet

Drilling Company	: SAIC
Driller	: Joe Schultheis
Designation of Drill	: Hand Auger
Type of Drill Rig	: Hand Auger
Geologist	: Brad Richardson
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3.5 inches
Sampling Equipment	: 3.5" OD SS Hand Auger
	: SS Bowl & Spoon

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GP		(0.0-1.0) Gravel fill with Silty CLAY matrix.	Rad gamma 10K at 0.33-0.66' Rad gamma 12.5K at 0.66-0.9'		PVSB0113		1030 Sample PVSB0113 collected 0.0-0.66 bgs for RAD analysis
1	-1			Refusal @ 1.0' bgs.					Surface gamma at 102K cpm. ~4" downhole seemed to be httest - 20K cpm
2	-2								
3	-3								
4	-4								
5	-5								RAD BKG gamma = 10K cpm
6	-6								
7	-7								1055 Begin augering 1105 Finish boring
8	-8								All colors from Munsell Soil Color Chart 1992 Revised Edition
9	-9								
10									

An Employee-Owned Company

Soil Boring IAC-SB0005

(Page 1 of 1)

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAC	: SB0005
Start Date	: 09/14/00
End Date	: 09/14/00
Northing Coord.	: 232736.33 State Plane
Easting Coord.	: 705271.51 Meters NAD 83
Total Depth of Boring	: 1.0 feet

Drilling Company	: SAIC
Driller	: Joe Schultheis
Designation of Drill	: Hand Auger
Type of Drill Rig	: Hand Auger
Geologist	: Brad Richardson
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3.5 inches
Sampling Equipment	: 3.5" OD SS Hand Auger : SS Bowl & Spoon

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GP		(0.0-1.0) Gravel fill with Silty CLAY matrix.	Rad gamma 12K 0.0-0.5' Rad gamma 12K 0.5-1.0'		PVSB0111		1120 Sample PVSB0111 collected 0.0-0.5 bgs for RAD analysis Surface gamma at 20K cpm.
1	-1			Refusal @ 1.0' bgs.					
2	-2								
3	-3								
4	-4								
5	-5								RAD BKG gamma = 12K cpm
6	-6								
7	-7								1110 Begin augering 1125 Finish boring
8	-8								All colors from Munsell Soil Color Chart 1992 Revised Edition
9	-9								
10									

12-20-2000 c:\Paine\IACSB005.BOR

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAC-SB0006

(Page 1 of 1)

Painesville Site IAC	: SB0006
Start Date	: 09/20/00
End Date	: 09/20/00
Northing Coord.	: 232734.64 State Plane
Easting Coord.	: 705274.17 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3 inches
Sampling Equipment	: 2" OD Split Spoon 2'
SS Bowl & Spoon	: 3" OD Split Spoon 2'

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GP		(0.0-1.6) GRAVEL and SAND, angular; 10% silt; dry; very loose; 10YR6/2 light brownish gray.	Rad gamma 6000 -7000 cpm			0-2'	
1	-1				PID 0 ppm		PVSB0224	1.5'	1635 Sample PVSB0224 collected 1.0-1.6 bgs for RAD analysis
2	-2	CL		(1.6-2.1) Silty CLAY; 10% medium gravel; moist; stiff; medium plasticity; 10YR4/1 dark gray.	Rad gamma 6000 -7000 cpm			2-4'	
3	-3	CL		(2.1-4.0) Silty CLAY; 10% medium gravel; moist; hard; medium plasticity; 105RY5/2 yellowish brown.	PID 0 ppm			2.0'	Sample PVSB0224 collected from 1.0-1.6' (which is just above native soil) for RAD only.
4	-4			(4.0-6.0) No recovery due to rock stuck in split spoon.	Rad gamma 6000 -7000 cpm			4-6'	Rad gamma on all sample cores 6,000-7,000 cpm
5	-5				PID 0 ppm			0.0'	PID on all sample cores 0.0 ppm
6	-6	CL		(6.0-8.0) Silty CLAY; 10% medium gravel; moist; hard; non-plastic; 10YR5/2 yellowish brown.	Rad gamma 6000 -7000 cpm			6-8'	
7	-7				PID 0 ppm			1.25'	
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 7000 - 8000 cpm
16	-16								
17	-17								1604 Begin drilling 1638 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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SAIC
An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAC-SB0007

(Page 1 of 1)

Painesville Site IAC	: SB0007
Start Date	: 09/20/00
End Date	: 09/20/00
Northing Coord.	: 232743.28 State Plane
Easting Coord.	: 705273.41 Meters NAD 83
Total Depth of Boring	: 7.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3 inches
Sampling Equipment	: 2" OD Split Spoon 2'
SS Bowl & Spoon	: 3" OD Split Spoon 2'

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-1.0) Concrete.					
1	-1	GP		(1.0-1.8) GRAVEL and SAND, cobble size gravel; 25% silt; very loose; 10YR4/1 dark gray.					
2	-2	CL		(1.8-2.8) Silty CLAY; 25% medium to coarse gravel; moist; very stiff; medium plasticity; 10YR4/2 dark grayish brown.	Rad gamma 6000 -7000 cpm		PVSB0227	1.5-3.5'	1735 Sample PVSB0227 collected 1.5-2.25 bgs for RAD analysis
3	-3	CL		(2.8-7.5) Silty CLAY; 10% medium gravel; moist; very stiff; medium plasticity; 105RY5/4 yellowish brown.	PID 0 ppm			1.5'	Sample PVSB0224 was collected from 0.5-1.25' below the base of the concrete.
4	-4				Rad gamma 6000 -7000 cpm			3.5-5.5'	
5	-5				PID 0 ppm			1.75'	
6	-6				Rad gamma 6000 -7000 cpm			5.5-7.5	
7	-7				PID 0 ppm			1.6'	
8	-8			Bottom of Boring @ 7.5' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 7000 cpm
16	-16								
17	-17								1639 Begin drilling 1745 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAC-SB0008

Painesville Site IAC	: SB0008
Start Date	: 09/21/00
End Date	: 09/21/00
Northing Coord.	: 232750.47 State Plane
Easting Coord.	: 705273.83 Meters NAD 83
Total Depth of Boring	: 6.6 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3 inches
Sampling Equipment	: 2" OD Split Spoon 2'
SS Bowl & Spoon	: 3" OD Split Spoon 2'

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.6) Concrete.					
1	-1	GP		(0.6-1.0) GRAVEL and SAND; 10% silt; wet; very loose.	Rad gamma 7000 -8000 cpm		PVSB0230	0.6-2.6'	
2	-2	CL		(1.0-4.5) Silty CLAY; 20% fine to medium gravel; wet; soft; high plasticity; 10YR4/1 dark gray.	PID 0 ppm			0.6'/0.7*	0835 Sample PVSB0230 collected 1.0-1.5 bgs for RAD analysis
3	-3				Rad gamma 7000 -8000 cpm			2.6-4.6'	*A second split spoon was driven from 0-2' beneath the concrete to obtain better sample recovery.
4	-4				PID 0 ppm			0.9'	
5	-5	ML		(4.5-6.6) Clayey SILT; 10% fine to medium gravel; moist; stiff; non-plastic; 10YR5/6 yellowish brown.	Rad gamma 7000 -8000 cpm			4.6-6.6'	Rad gamma on all sample cores 7,000-8,000 cpm.
6	-6				PID 0 ppm			1.5'	PID response on all core samples 0.0 ppm.
7	-7			Bottom of Boring @ 6.6' bgs.					
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 7000-8000 cpm
16	-16								
17	-17								0735 Begin drilling 0840 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAC-SB0009

Painesville Site IAC	: SB0009
Start Date	: 09/21/00
End Date	: 09/21/00
Northing Coord.	: 232790.13 State Plane
Easting Coord.	: 705273.42 Meters NAD 83
Total Depth of Boring	: 5.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3 inches
Sampling Equipment	: 2" OD Split Spoon 2'
SS Bowl & Spoon	: 3" OD Split Spoon 2'

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.9) Concrete.					
1	-1	FL		(0.9-1.5) WOOD & GRAVEL; railroad tie and base gravel.					
2	-2	FL		(1.5-2.2) Silty CLAY; 2% fine to coarse gravel; coal fragments; moist; very stiff; low plasticity; 10YR4/1 dark gray.	Rad gamma 5500 cpm		PVSB0233	1.5-2.5'	0945 Sample PVSB0233 collected 1.5-2.5 bgs for RAD analysis
3	-3				PID 0 ppm			1.5'	Rad gamma on all sample cores 5,500 cpm.
4	-4	FL		(2.2-5.3) Silty CLAY; 20% medium to coarse gravel; coal fragments; moist; soft; high plasticity; 10YR3/1 very dark gray.	Rad gamma 5500 cpm			2.5-4.5'	PID response on all core samples 0.0 ppm.
5	-5				PID 0 ppm			1.5'	
6	-6			Split spoon refusal @ 5.3' bgs.					
7	-7								
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6000 cpm
16	-16								
17	-17								0920 Begin drilling 0955 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAD-SB0001

Painesville Site IAD	: SB0001	Drilling Company	: Double J Drilling
Start Date	: 09/19/00	Driller	: Don Malone
End Date	: 09/19/00	Designation of Drill	: Diedrich
Northing Coord.	: 232706.90 State Plane	Type of Drill Rig	: Direct Push Technology
Easting Coord.	: 705198.23 Meters NAD 83	Geologist	: Joe Schultheis
Total Depth of Boring	: 8.0 feet	Depth to Bedrock	: Not Encountered
		Depth Drilled Into Rock	: NA
		Borehole Diameter	: 2.5 inches
		Sampling Equipment	: 4' Sampling Tube 2.25" OD
		SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GM		(0.0-0.5) GRAVEL with SAND, angular; 25% silt; dry; loose; 10YR5/1 gray.			PVSB0200		
1	-1	CL		(0.5-1.6) Silty CLAY; 20% fine to medium gravel, subangular; moist; very stiff; non-plastic; 10YR4/6 dark yellowish brown.	Rad gamma 11000-13000 cpm			0-4'	1555 Sample PVSB0200 collected 0.0-1.0 bgs for RAD analysis
2	-2								
3	-3	ML		(1.6-3.5) Clayey SILT; 10% gravel, subangular; moist; very stiff; plastic; 10YR4/1 dark gray.	PID 0 ppm			2.95'	
4	-4			(3.5-8.0) Silty CLAY; moist; stiff; high plasticity; 10YR4/1 dark gray.					
5	-5				Rad gamma 11000-13000 cpm			4-8'	
6	-6	CL							
7	-7			7-8' is dark grayish brown 10YR4/2	PID 0 ppm			3.3'	
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 50,000 cpm
16	-16								
17	-17								1540 Begin drilling 1559 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAD-SB0002

Painesville Site IAD	: SB0002
Start Date	: 09/19/00
End Date	: 09/19/00
Northing Coord.	: 232702.37 State Plane
Easting Coord.	: 705198.21 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GM		(0.0-0.5) GRAVEL with SAND, angular; 25% silt; dry; loose; 10YR5/1 gray.			PVSB0203		
1	-1	CL		(0.5-1.2) Silty CLAY; 20% fine to medium gravel, subangular; moist; very stiff; non-plastic; 10YR4/6 dark yellowish brown.	Rad gamma 15000 cpm			0-4'	1615 Sample PVSB0203 collected 0.0-1.0 bgs for RAD analysis
2	-2								
3	-3	CL		(1.2-6.0) Silty CLAY; wet; stiff; high plasticity; 10YR5/8 yellowish brown.	PID 0 ppm			2.6'	
4	-4								
5	-5				Rad gamma 15000 cpm			4-8'	
6	-6	ML		(6.0-6.5) Clayey SILT; 10% fine sand; saturated; non-plastic; 10YR5/8 yellowish brown.					
7	-7	CL		(6.5-8.0) Silty CLAY; 10% medium gravel; moist; very stiff; low plasticity; 10YR4/3 brown.	PID 0 ppm			3.2'	
8	-8								
9	-9			Bottom of Boring @ 8.0' bgs.					
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 50,000 cpm
16	-16								
17	-17								1600 Begin drilling 1618 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAD-SB0003

Painesville Site IAD	: SB0003
Start Date	: 09/20/00
End Date	: 09/20/00
Northing Coord.	: 232712.83 State Plane
Easting Coord.	: 705188.08 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.5) Rock, silty sand, roadway gravel, piece of copper conduit.			PVSB0212		
		CL		(0.5-0.9) Silty CLAY; 10% gravel; 10% fine to medium sand; moist; 10YR3/2 very dark grayish brown.	Rad gamma 10000-11000 cpm				
1	-1	CL		(0.9-1.2) Silty CLAY; 10% gravel; 20% fine sand; very stiff; 10YR5/4 yellowish brown.				0-4'	0955 Sample PVSB0212 collected 0.0-1.0 bgs for RAD analysis
2	-2								
3	-3			(1.2-4.0) No sample due to low recovery.	PID 0 ppm			1.5'	
4	-4	CL		(4.0-7.0) Silty CLAY; 20% fine sand; wet; stiff; medium plasticity; 10YR4/6 dark yellowish brown.					
5	-5				Rad gamma 10000-11000 cpm			4-8'	
6	-6								
7	-7			(7.0-8.0) Same as above but very stiff.	PID 0 ppm			4.0'	
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 50,000 cpm
16	-16								
17	-17								0935 Begin drilling 0957 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAD-SB0004

Painesville Site IAD	: SB0004
Start Date	: 09/20/00
End Date	: 09/20/00
Northing Coord.	: 232702.37 State Plane
Easting Coord.	: 705229.27 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	SM		(0.0-0.6) Sandy SILT; 25% medium to coarse gravel; root; dry; loose; 10YR5/2 grayish brown.			PVSB0215		1032 Sample PVSB0215 collected 0.0-1.0 bgs for RAD, TAL, & TCL analyses
1	-1	GP		(0.6-0.9) ROCK and GRAVEL; 25% sand.	Rad gamma 9000-10000 cpm			0-4'	
2	-2	ML		(0.9-2.5) Clayey SILT; 10% medium gravel; very stiff; non-plastic; 10YR5/4 yellowish brown.					Pushed 0-4' interval twice to get sufficient soil volume for sample.
3	-3			(2.5-4.0) No sample due to poor recovery.	PID 0 ppm			2.5'	Had to use chisel point to break through roack at 4' depth.
4	-4	CL		(4.0-6.4) Silty CLAY; 10% medium gravel; moist; soft; low plasticity; 10YR5/6 yellowish brown.					
5	-5				Rad gamma 9000-10000 cpm			4-8'	
6	-6								
7	-7	CL		(6.4-8.0) Silty CLAY; 10% medium gravel; moist; very stiff; medium plasticity; 10YR4/3 brown.	PID 0 ppm			2.95'	
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 11,000 cpm
16	-16								
17	-17								0958 Begin drilling 1040 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAG-SB0001

Painesville Site IAG	: SB0001
Start Date	: 09/19/00
End Date	: 09/19/00
Northing Coord.	: 232890.38 State Plane
Easting Coord.	: 705034.92 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Joe Schultheis
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GC		(0.0-0.4) CLAY; 25% gravel; 10% sand; moist; medium plasticity; 10YR4/2 dark grayish brown.					
1	-1	GP		(0.4-1.2) SAND and GRAVEL; 10% silt; 10% clay; saturated; loose; 10YR2/1 black.	Rad gamma<bkg		PVSB0109	0-4'	1455 Sample PVSB0109 collected 0.5-1.5 bgs for RAD analysis
2	-2								All soil in core gamma 9,000-11,000 cpm
3	-3	CL		(1.2-4.6) Silty CLAY; 20% fine to medium sand; 5% gravel; moist; stiff; medium plasticity; 10YR2/1 black.	PID < bkg			2.95'	PID readings all 0.0 ppm
4	-4								
5	-5	CL		(4.6-8.0) Silty CLAY; 20% gravel; moist; medium plasticity; 10YR4/1 dark gray.	Rad gamma<bkg			4-8'	
6	-6								
7	-7				PID < bkg			3.6'	
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 25,000 cpm
16	-16								
17	-17								1430 Begin drilling 1500 Finish drilling
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAP1B-SB0001

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAP1B	: SB0001
Start Date	: 09/06/00
End Date	: 09/06/00
Northing Coord.	: 232756.25 State Plane
Easting Coord.	: 705170.68 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	SC		(0.0-0.2) fine SAND; trace gravel to 8mm, angular on surface; dry; dense; non-plastic; 10YR5/3 brown.					
1	-1	CL		(0.2-2.1) CLAY; trace very fine sand; trace silt; moist; stiff; medium plastic; 10YR4/2 dark grayish brown mottled with 10YR4/6 dark yellowish brown.	Rad gamma bkg cpm		PVSB0115	0-4'	1532 Sample PVSB0115 collected 0.2-1.2 bgs for RAD analysis
2	-2	CL		(2.1-3.1) CLAY; trace very fine sand; trace silt; moist; very stiff; medium plastic; 2.5Y3/2 very dark grayish brown mottled with 2.5Y3/3 dark olive brownl.					Breathing zone PID = 0 ppm LEL - 0
3	-3			(3.1-4.0) No recovery.	PID 0 ppm			3.1'	Westside of Building 414
4	-4	ML		(4.0-5.25) SILT; some fine sand; moist, wet interval at 5' bgs; medium dense; non-plastic; 5Y4/4 olive and 10YR4/6 dark yellowish brown.					
5	-5	CL		(5.25-7.0) CLAY; trace fine sand; trace silt; trace gravel to 15mm, subrounded; moist; 10YR4/4 dark yellowish brown.	Rad gamma bkg cpm			4-8'	
6	-6								
7	-7	CL		(7.0-8.0) CLAY; trace silt; trace fine sand; moist to wet 7-7.5', moist rest of interval; dense; non-plastic; 10YR5/2 grayish brown and 10YR3/1 very dark gray.	PID 0 ppm			4.0'	
8	-8			Bottom of Boring @ 8.0' bgs.					Bottom of boring at 8' bgs. Hole backfilled with medium bentonite chips.
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6700 cpm
16	-16								
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0002

Painesville Site IAP1B : SB0002
Start Date : 09/06/00
End Date : 09/06/00
Northing Coord. : 232738.47 State Plane
Easting Coord. : 705180.33 Meters NAD 83
Total Depth of Boring : 7.7 feet

Drilling Company : Double J Drilling
Driller : Don Malone
Designation of Drill : Diedrich
Type of Drill Rig : Direct Push Technology
Geologist : Paul Parrish
Depth to Bedrock : Not Encountered
Depth Drilled Into Rock: NA
Borehole Diameter : 2.5 inches
Sampling Equipment : 4' Sampling Tube 2.25" OD
SS Bowl & Spoon : Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0			(0.0-2.5) FILL MATERIAL:					
1	-1	FL		0-0.8 SILT; some fine sand; trace gravel to 15mm, subangular to angular; dry; non-plastic; 10YR5/4 yellowish brown.	Rad gamma bkg cpm		PVSB0116	0-4'	1641 Sample PVSB0116 collected 0.0-1.5 bgs for RAD analysis
2	-2			0.8-1.0 Limestone Gravel 1.0-1.3 Same silt as above 1.3-1.4 Limestone Gravel					Breathing zone PID = 0 ppm LEL - 0
3	-3			1.4-2.0 Same silt as above 2.0-2.5 Limestine Gravel, angular; dry; dense.	PID 0 ppm			2.5'	Southside of Building 414
4	-4	CL		(2.5-4.0) No recovery. (4.0-4.4) CLAY; moist to very moist; very stiff; plastic; black.					
5	-5			(4.4-7.2) CLAY; trace fine sand; trace silt; 10YR4/4 dark yellowish brown.	Rad gamma bkg cpm			4-8'	
6	-6	CL							
7	-7	CL		(7.2-7.7) CLAY; "TILL"; some silt; trace fine sand; moist; very dense; slightly plastic; 10YR3/1 very dark gray.	PID 0 ppm			3.7'	
8	-8			Bottom of Boring @ 7.7' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6000 cpm
16	-16								
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0003

Painesville Site IAP1B	: SB0003
Start Date	: 09/06/00
End Date	: 09/06/00
Northing Coord.	: 232761.07 State Plane
Easting Coord.	: 705188.25 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GP		(0.0-0.6) GRAVEL and medium SAND, angular, gravel is angular to subangular; dry; dense; non-plastic; 10YR5/3 brown.	Rad gamma bkg cpm				
1	-1	CL		(0.6-1.1) CLAY; trace fine sand; moist; stiff; plastic; 10YR2/1 black.			PVSB0121	0-4'	1728 Sample PVSB0121 collected 0.6-1.8 bgs for RAD analysis
2	-2	FL		(1.1-2.6) CLAY; trace fine sand; trace gravel to 10mm, subrounded; brick; moist; medium stiff; medium plastic; 5Y4/3 olive.					
3	-3	CL			PID 0 ppm			3.1'	Breathing zone PID = 0 ppm LEL - 0
4	-4			(2.6-4.2) CLAY; some very fine to very coarse sand; trace gravel to 20mm, angular to subangular; moist; hard; non-plastic.					Eastside of Building 414
5	-5			(4.2-8.0) CLAY; some fine sand; trace silt; moist; stiff; medium plastic; 10YR5/1 gray and 10YR5/8 yellowish brown.	Rad gamma bkg cpm			4-8'	
6	-6	CL							
7	-7				PID 0 ppm			4.0'	
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 5600 cpm
16	-16								
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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Soil Boring IAP1B-SB0004

(Page 1 of 1)

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAP1B	: SB0004
Start Date	: 09/06/00
End Date	: 09/06/00
Northing Coord.	: 232782.13 State Plane
Easting Coord.	: 705190.83 Meters NAD 83
Total Depth of Boring	: 8.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GP		(0.0-1.0) GRAVEL and medium SAND, gravel to 25mm, angular to subangular; dry; medium dense; non-plastic; 10YR7/2 light gray.	Rad gamma bkg cpm				
1	-1							0-4'	
2	-2	FL		(1.0-4.2) FILL MATERIAL - CLAY; trace fine sand; trace gravel to 40mm, angular; brick; moist; medium plastic; 5Y4/3 olive.			PVSB0124 PVSB9000		1758 Samples PVSB0124 and PVSB9000 collected 1.0-3.0 bgs for RAD analysis
3	-3				PID 0 ppm			3.25	Southside of Building 415
4	-4								
5	-5	CL		(4.2-8.0) CLAY; some fine sand; trace silt; moist; stiff to soft (in places); medium plastic; 10YR4/4 dark yellowish brown with 10YR5/1 gray and 10YR5/8 yellowish brown.	Rad gamma bkg cpm			4-8'	
6	-6								
7	-7				PID 0 ppm			4.0'	
8	-8			Bottom of Boring @ 8.0' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6000 cpm
16	-16								
17	-17								
18	-18								All colors from Munsell Soil Color Chart 1992 Revised Edition
19	-19								
20									

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An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0005

(Page 1 of 1)

Painesville Site IAP1B	: SB0005
Start Date	: 09/07/00
End Date	: 09/07/00
Northing Coord.	: 232773.05 State Plane
Easting Coord.	: 705190.67 Meters NAD 83
Total Depth of Boring	: 11.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-1.0) FILL MATERIAL - SAND, medium, and GRAVEL to 10mm, angular; dry; medium dense; non-plastic; 10YR7/2 light gray.	Rad gamma <bkg cpm		PVSB0127 PVSB9001 PVSB9500	0-3' 0-3' 0-4'	0930 Samples PVSB0127, PVSB9500 and PVSB9001 collected 1.0-2.5 bgs for RAD, TAL, & TCL analyses
1	-1	FL		(1.0-4.2) FILL MATERIAL - CLAY; trace fine sand; trace gravel to 35mm, rounded; pieces of brick; moist; stiff; medium plastic; 2.5Y4/2 dark grayish brown.	PID 0 ppm			1.2' 1.3' 3.0'	South of Building 415 along northside of blast wall on Building 414.
2	-2								
3	-3								
4	-4	CL		(4.2-4.5) CLAY; some fine sand; trace silt; moist; stiff; medium plastic; 10YR4/4 dark yellowish brown with 10YR5/1 gray and 10YR5/8 yellowish brown.	Rad gamma <bkg cpm			4-8'	
5	-5	GC		(4.5-4.8) GRAVEL, to 20mm, subangular to subrounded; some clay; wet; dense; non-plastic; 5YR3/4 dark reddish brown.					
6	-6	CL		(4.8-8.0) Same CLAY as 4.2-4.5 interval.	PID 0 ppm			4.0'	
7	-7								
8	-8	CL		(8.0-11.5) No description. Shelby tube collected. It appears to be same as above.	Rad gamma <bkg cpm			8-11.5'	0945 Sample PVSB0128 collected 8.0-9.25' bgs for geotechnical.
9	-9								Five borings needed to collect enough sample material.
10	-10				PID 0 ppm			1.25'	
11	-11								
12	-12			Bottom of Boring @ 11.5' bgs.					
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6000 cpm
16	-16								0835 Begin drilling 0842 Refusal at 3' in boring. Hit possible footer for blast wall. Move to new location 0848 Refusal at 3' in 2nd boring. Move again.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0006

(Page 1 of 1)

Painesville Site IAP1B	: SB0006
Start Date	: 09/07/00
End Date	: 09/07/00
Northing Coord.	: 232767.61 State Plane
Easting Coord.	: 705229.74 Meters NAD 83
Total Depth of Boring	: 7.25 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25'' OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.2) FILL MATERIAL - SAND, medium, and GRAVEL to 8mm, angular to subangular; dry; loose; 10YR6/2 light brownish gray.					
		FL		(0.2-0.7) FILL MATERIAL - SAND, fine to medium, and GRAVEL, fine; moist; dense; 10YR4/2 dark grayish brown.					
1	-1				Rad gamma <bkg cpm			0-2' 0-4'	Breathing zone PID 0 ppm LEL 0
2	-2						PVSB0130 MS/MSD		1113 Sample PVSB0130 collected 1.5-2.5 bgs for RAD analysis MS/MSD.
3	-3	FL		(0.7-6.0) FILL MATERIAL - CLAY; trace sand; trace gravel; moist; stiff to medium stiff; plastic; 10YR4/6 dark yellowish brown, 2.5Y5/6 light olive brown, and 2.5Y3/2 very dark grayish brown.	PID 0 ppm			1.2' 2.5'	MDI/TDI Transfer Building.
4	-4								Fill Material to 6.7' bgs.
5	-5				Rad gamma <bkg cpm			4-8'	Three borings needed to get to depth.
6	-6	FL		(6.0-6.7) FILL MATERIAL - Fly ash, cinders, gravel; moist to wet; soft.					
7	-7	CL		(6.7- 7.25) CLAY; some fine sand; trace silt; very moist; medium stiff; plastic; 10YR4/4 dark yellowish brown with 10YR5/1 gray and 10YR5/8 yellowish brown.	PID 0 ppm			3.25'	
8	-8								
9	-9			Bottom of Boring @ 7.25' bgs.					
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 5200 cpm
16	-16								1000 Setup on boring 1035 Begin drilling 1039 Refusal at 2' on concrete. Moved 4' west to try again 1101 Refusal in 2nd hole. Move forward another 6'.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

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An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0007

Painesville Site IAP1B	: SB0007
Start Date	: 09/07/00
End Date	: 09/07/00
Northing Coord.	: 232802.52 State Plane
Easting Coord.	: 705187.97 Meters NAD 83
Total Depth of Boring	: 7.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.5) Asphalt, Gravel; medium to coarse sand.					
1	-1	CL		(0.5-5.0) CLAY; some fine to medium sand; moist; medium stiff to stiff; slightly plastic; 2.5Y3/2 very dark grayish brown mottled with 2.5Y6/8 olive yellow.	Rad gamma bkg cpm		PVSB0133	0-4'	1202 Sample PVSB0133 collected 0.5-1.5 bgs for RAD analysis.
2	-2								
3	-3				PID 0 ppm			2.2'	
4	-4								
5	-5	CL		(5.0- 7.5) CLAY; trace fine sand; moist; medium stiff; plastic; 10YR5/8 yellowish brown mottled with 10YR5/1 gray.	Rad gamma bkg cpm			4-8'	
6	-6					PVSB0134			1205 Sample PVSB0134 collected 5.0-6.7' bgs for geotechnical.
7	-7				PID 0 ppm			3.5'	Northside of Building 415
8	-8			Bottom of Boring @ 7.5' bgs.					Two borings needed to get enough sample volume.
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 4800 cpm
16	-16								1127 Setup and drilling
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

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An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0008

Painesville Site IAP1B	: SB0008
Start Date	: 09/07/00
End Date	: 09/07/00
Northing Coord.	: 232774.33 State Plane
Easting Coord.	: 705228.92 Meters NAD 83
Total Depth of Boring	: 7.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.8) FILL MATERIAL - GRAVEL to 35mm, subangular; some fine to medium sand; trace clay; moist; dense; non-plastic; 10YR3/2 very dark grayish brown.	Rad gamma bkg cpm				
1	-1						PVSB0136	0-3.9'	1428 Sample PVSB0136 collected 1.0-2.0 bgs for RAD, TAL, & TCL analyses.
2	-2	FL		(0.8-3.5) FILL MATERIAL - CLAY; trace medium sand; trace gravel to 20mm, subangular; moist; very stiff; medium plastic; 5Y4/3 olive mottled with 5Y5/6 olive and 5Y6/4 pale olive.					MDI/TDI Transfer Building
3	-3				PID 0 ppm			3.5'	Four borings needed to get to depth.
4	-4			(3.5-4.0) Brick in shoe at refusal depth.					Fill Material 0-3.5'
5	-5	CL		(4.0- 7.5) CLAY; trace fine sand; trace gravel to 8mm, subrounded; moist; very stiff; slightly plastic; 5Y4/2 olive mottled with 10YR4/6 dark yellowish brown. Sandy SILT zone at 4.5-5.0' interval wet to very moist.	Rad gamma bkg cpm			4-8'	
6	-6					PVSB0134			
7	-7				PID 0 ppm			3.5'	
8	-8			Bottom of Boring @ 7.5' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6000 cpm
16	-16								1415 Begin drilling 1430 Refusal at 3.9' bgs 1443 Refusal at same depth in 2 other holes.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

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An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0009

(Page 1 of 1)

Painesville Site IAP1B	: SB0009
Start Date	: 09/07/00
End Date	: 09/07/00
Northing Coord.	: 232751.89 State Plane
Easting Coord.	: 705231.24 Meters NAD 83
Total Depth of Boring	: 10.25 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-1.0) FILL MATERIAL - GRAVEL to 10mm, angular; some fine to coarse sand; trace clay; dry; medium dense; non-plastic; 10YR5/3 brown.	Rad gamma bkg cpm				
1	-1	FL		(1.0-3.6) FILL MATERIAL - Silty SAND; trace gravel to 10mm, subangular; moist, wet in places; medium dense; 10YR4/6 dark yellowish brown.			PVSB0139	0-4'	1530 Sample PVSB0139 collected 1.1-2.1 bgs for RAD, TAL, & TCL analyses.
2	-2								MDI/TDI Transfer Building
3	-3				PID 0 ppm			3.8'	One boring needed to Collect all samples.
4	-4	FL		(3.6-3.8) FILL MATERIAL - medium to coarse SAND; trace clay; dry; medium dense 5YR3/4 dark reddish brown.					Fill Material 0-3.8'
5	-5	CL		(3.8- 7.6) CLAY; trace fine to medium sand; trace gravel to 8mm, subrounded; moist; very stiff; slightly plastic; 5Y4/3 olive mottled with 10YR4/6 dark yellowish brown.	Rad gamma bkg cpm			4-8'	
6	-6								
7	-7				PID 0 ppm			3.6'	
8	-8			(7.6-8.0) No recovery					
				(8.0-10.25) No description shelby tube collected. Appears to be "Till" gray in the bottom of tube.					
9	-9					PVSB0140			Sample PVSB0140 collected 8.0-10.25' bgs for geotechnical
10	-10			Bottom of Boring @ 10.25' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6000 cpm
16	-16								1500 Setup on hole and begin drilling
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0010

Painesville Site IAP1B	: SB0010
Start Date	: 09/07/00
End Date	: 09/07/00
Northing Coord.	: 232782.89 State Plane
Easting Coord.	: 705145.32 Meters NAD 83
Total Depth of Boring	: 7.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-1.0) FILL MATERIAL - GRAVEL to 20mm, angular to subangular; clay; dry; dense; non-plastic; 10YR6/2 light brownish gray with 10YR4/2 dark grayish brown clay.	Rad gamma bkg cpm				
1	-1	FL		(1.0-1.5) FILL MATERIAL - CLAY; trace fine to medium sand; trace gravel to 10mm, subangular; moist; stiff; 5Y3/2 dark oi\live gray and 5Y2.5/2 black.			PVSB0142	0-4'	1639 Sample PVSB0142 collected 1.0-1.75 bgs for RAD analysis.
2	-2	FL		(1.5-4.3) FILL MATERIAL - Pea Gravel; some medium sand; moist; 5Y3/1 very dark gray.					Westside of Building 415
3	-3				PID 0 ppm			1.75	Two borings needed to get enough sample volume.
4	-4								Fill Material 0-4.3'
5	-5	CL		(4.3- 7.0) CLAY; trace fine sand; moist; very stiff to stiff; slightly plastic; 10YR4/4 dark yellowish brown mottled with 10YR5/8 yellowish brown and 10YR5/2 grayish brown.	Rad gamma bkg cpm	PVSB0143		4-8'	1650 Sample PVSB0143 collected 4.0-6.3' bgs for geotechnical
6	-6								
7	-7			Bottom of Boring @ 7.0' bgs.	PID 0 ppm			3.0'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6000 cpm
16	-16								
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

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An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0011

Painesville Site IAP1B	: SB0011
Start Date	: 09/07/00
End Date	: 09/07/00
Northing Coord.	: 232791.26 State Plane
Easting Coord.	: 705161.67 Meters NAD 83
Total Depth of Boring	: 10.3 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock:	NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GW		(0.0-0.75) GRAVEL to 30mm, angular; dry at bottom, moist on surface; 10YR4/1 dark gray.					
		GW		10YR8/1 white 0.5-0.75					
1	-1				Rad gamma bkg cpm		PVSB0145	0-4'	1738 Sample PVSB0145 collected 0.75-1.75 bgs for RAD analysis.
2	-2	CL		(0.75-2.75) Silty CLAY; trace fine to medium sand; trace gravel to 8mm, angular; moist; soft; non-plastic; 10YR5/3 brown mottled with 10YR5/1 gray and 10YR5/6 yellowish brown.					
3	-3				PID 0 ppm			2.75'	Northside of Building 415 One hole needed to collect all of the samples.
4	-4	FL		(2.75-4.0) No recovery. (4.0-4.5) CLAY; some fine to coarse sand; pieces of slag; trace gravel to 15mm, angular; moist; medium stiff; non-plastic; 5Y3/2 dark olive gray.					
5	-5	CL			Rad gamma bkg cpm			4-8'	
6	-6			(4.5-6.75) CLAY; trace fine sand; trace silt; very stiff; 10YR5/3 brown mottled with 10YR5/6 yellowish brown.					
7	-7			(6.75-8.0) No recovery.	PID 0 ppm			2.75'	
8	-8			(8.0-10.3) Same Clay as above.	Rad gamma bkg cpm			8-10'	
9	-9	CL			PID 0 ppm	PVSB0146		2.3'	1745 Sample PVSB0146 collected 8.0-10.3' bgs for geotechnical
10	-10			Bottom of Boring @ 10.3' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 5500 cpm
16	-16								1720 Setup on hole begin drilling
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

An Employee-Owned Company

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0012

Painesville Site IAP1B	: SB0012
Start Date	: 09/08/00
End Date	: 09/08/00
Northing Coord.	: 232790.76 State Plane
Easting Coord.	: 705133.90 Meters NAD 83
Total Depth of Boring	: 6.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0			(0.0-1.0) Asphalt covering.	Rad gamma bkg cpm			0-3'	
1	-1			(1.0-6.0) FILL MATERIAL - SILT; some fine to medium sand; trace gravel to 15mm, subangular to angular; brick; dry; hard; non-plastic; 5Y3/2 dark olive gray, 5Y4/3 olive, and 5Y3/1 very dark gray.					0856 Sample PVSB0148 collected 3.5-5.5' bgs for RAD, TAL, & TCL analyses.
2	-2				PID 0 ppm			1.0'	
3	-3	FL							Eastside of Building 413
4	-4				Rad gamma bkg cpm			3-6.5'	Headspace reading on Rad sample peaked at 138ppm.
5	-5						PVSB0148		
6	-6	CL		(6.0-6.5) CLAY; trace fine sand; trace gravel to 10mm, rounded; moist; stiff; medium plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/1 gray and 10YR6/6 yellowish brown.	PID 138 ppm Peak Reading			3.5'	
7	-7								
8	-8			Bottom of Boring @ 6.5' bgs.					
9	-9								1745 Sample PVSB0146 collected 8.0-10.3' bgs for geotechnical
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6000 cpm
16	-16								0805 Rig setup on boring 0815 Refusal at 3' bgs. Very hard drilling. Lost shoe of drive casing.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
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Soil Boring IAP1B-SB0013

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IAP1B	: SB0013
Start Date	: 09/08/00
End Date	: 09/08/00
Northing Coord.	: 232777.06 State Plane
Easting Coord.	: 705104.67 Meters NAD 83
Total Depth of Boring	: 7.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GP		(0.0-1.5) GRAVEL and medium SAND; dry; dense; gravel to 40mm, angular to subangular; 10YR5/3 brown.	Rad gamma bkg cpm				
1	-1						PVSB0151	0-4'	0938 Sample PVSB0151 collected 0.5-1.5' bgs for RAD analysis.
2	-2	CL		(1.5-7.0) CLAY; trace fine sand; trace gravel to 10mm, subrounded; trace silt; 2.5Y5/4 light olive brown mottled with 10YR5/8 yellowish brown and 10YR5/3 brown.	PID 0 ppm			2.5'	
3	-3								Southside of Building 413
4	-4				Rad gamma bkg cpm			4-8'	
5	-5								
6	-6				PID 0 ppm			3.0'	
7	-7			Bottom of Boring @ 7.0' bgs.					
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6000 cpm
16	-16								0918 Begin Drilling
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0014

(Page 1 of 1)

Painesville Site IAP1B	: SB0014
Start Date	: 09/08/00
End Date	: 09/08/00
Northing Coord.	: 232817.56 State Plane
Easting Coord.	: 705103.76 Meters NAD 83
Total Depth of Boring	: 6.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0			(0.0-0.7) Asphalt.	Rad gamma bkg cpm			0-3'	
1	-1	CL		(0.7-1.2) CLAY; some gravel to 20mm, subangular; some medium sand; 2.5Y4/3 olive brown mottled with 2.5Y6/4 light yellowish brown.					1058 Sample PVSB0154 collected 4.0-5.0' bgs for RAD analysis.
2	-2	CL		(1.2-3.0) CLAY; trace fine sand; moist; very stiff; medium plastic; 5Y4/2 olive gray mottled with 5Y5/6 olive and 5Y2.5/1 black.	PID 0 ppm			1.5'	Northside of Building 413
3	-3							Drilled through interval	Two borings needed to get to depth.
4	-4			(3.0-4.0) No recovery.					
		FL		(4.0-5.0) FILL MATERIAL - Slag, gravel; fine to medium sand; dry; dense.	Rad gamma bkg cpm		PVSB0154		
5	-5	FL		(5.0-5.5) Transition to native clay described below.				4-8'	
6	-6	CL		(5.5-6.5) Silty CLAY; trace fine to medium sand; trace gravel to 10mm, subrounded; hard; non-plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/1 gray and 10YR6/6 yellowish brown.					
7	-7				PID 0 ppm			2.5'	
8	-8			Bottom of Boring @ 6.5' bgs.					
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 7200 cpm
16	-16								1010 Begin drilling. Refusal at 3' bgs, try second lcoation.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IAP1B-SB0015

Painesville Site IAP1B	: SB0015
Start Date	: 09/08/00
End Date	: 09/08/00
Northing Coord.	: 232808.04 State Plane
Easting Coord.	: 705086.14 Meters NAD 83
Total Depth of Boring	: 14.3 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GP		(0.0-0.75) GRAVEL to 20mm, angular; some fine to very coarse sand; trace clay; dry; dense; non-plastic.	Rad gamma bkg cpm			0-4'	
1	-1	CL		(0.75-1.25) CLAY; trace fine sand; trace gravel to 15mm, subangular; moist; very stiff; non-plastic; 2.5Y5/6 light olive brown.					1203 Sample PVSB0157 collected 4.5-5.5' bgs for RAD analysis.
2	-2				PID 0 ppm			2.5'	Westside of Building 413
3	-3	FL		(1.25-9.0) Same as above except more gravel, slag, brick pieces; 5Y4/2 olive gray mottled with 5Y5/6 olive and 5Y5/2 olive gray.					One boring needed for hole.
4	-4								
5	-5				Rad gamma <bkg cpm		PVSB0157	4-8'	
6	-6								
7	-7				PID 0 ppm			2.5'	
8	-8								
9	-9	CL		(9.0-10.2) Silty CLAY; trace fine sand; trace gravel to 10mm, subangular; moist; very stiff to hard; non-plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/2 grayish brown and 10YR5/1 gray.	Rad gamma <bkg cpm			8-12'	
10	-10								
11	-11			(10.2-12.0) No recovery.	PID 0 ppm			2.2'	
12	-12	CL		(12.0-14.3) Shelby tube collected. Top of tube had CLAY as above, bottom of tube had gray "TILL".	Rad gamma <bkg cpm			12-14.5'	
13	-13					PVSB0158			1209 Sample PVSB0158 collected 12.0-14.3' bgs for geotechnical.
14	-14				PID 0 ppm			2.3'	
15	-15			Bottom of Boring @ 14.3' bgs.					RAD BKG gamma = 6000 cpm
16	-16								1130 Setup on boring. 1137 Begin drilling.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
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Painesville FUSRAP Site
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Painesville, Ohio

Soil Boring IAP1B-SB0016

Painesville Site IAP1B	: SB0016
Start Date	: 09/12/00
End Date	: 09/12/00
Northing Coord.	: 232764.38 State Plane
Easting Coord.	: 705244.92 Meters NAD 83
Total Depth of Boring	: 9.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	GC CL	(0.0-0.2) GRAVEL to 30mm, subangular; some clay; moist; dense; non-plastic; 10YR3/1 very dark gray.					
1	-1	CL		Rad gamma 8200 cpm			0-4'	0943 Sample PVSB0160 collected 4.0-5.0' bgs for RAD, TAL, & TCL analyses.
2	-2	FL	(0.2-0.5) CLAY; some fine to coarse sand; trace gravel to 10mm, subangular; moist; very stiff; non-plastic; 10YR4/2 dark grayish brown.	PID 0 ppm			2.3'	
3	-3		(0.5-1.7) CLAY; some fine to medium sand; trace gravel to 8mm, angular; moist; stiff; medium plastic; 7.5YR4/6 strong brown mottled with 5Y5/4 olive and 10YR5/8 yellowish brown.					Eastside of MDI/TDI Transfer Building.
4	-4	CL		Rad gamma 9200 cpm		PVSB0160	4-8'	Water is sitting on top of clay just below gravel zone at 4.5-4.7' bgs.
5	-5		(1.7-2.0) Medium SAND; trace clay; ash; piece of concrete; gley color chart 5GY4/1.	PID spiked at 37 ppm			2.6'	One boring needed to get to depth.
6	-6		(2.0-2.3) same as 0.5-1.7 interval. (2.3-4.0) No recovery.					
7	-7	ML	(4.0-5.1) CLAY; some gravel to 15mm, angular; wet; plastic; oily appearence and odor; gravel zone at 4.5-4.7' bgs; 10YR2/1 black in gravel zone and 10YR4/1 dark gray for the rest.				8" of water on top of core	
8	-8						8-9.5' 1.5'	
9	-9		(5.1-9.5) SILT; trace clay; trace fine sand; dry; very dense; non-plastic; 10YR5/3 brown with 10YR5/8 yellowish brown and 10YR5/2 grayish brown.	PID 0.8 ppm			4" of water on top of core	Bottom of boring at 9.5' bgs.
10	-10		Bottom of Boring @ 9.5' bgs.					
11	-11							
12	-12							
13	-13							1209 Sample PVSB0158 collected 12.0-14.3' bgs for geotechnical.
14	-14							
15	-15							RAD BKG gamma = 16,000 cpm
16	-16							0908 Setup on SB016 and begin drilling. 0950 Finish the boring. Part on rig is broken.
17	-17							
18	-18							
19	-19							All colors from Munsell Soil Color Chart 1992 Revised Edition
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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0001

(Page 1 of 1)

Painesville Site IARP	: SB0001
Start Date	: 09/08/00
End Date	: 09/08/00
Northing Coord.	: 232705.95 State Plane
Easting Coord.	: 705247.58 Meters NAD 83
Total Depth of Boring	: 10.3 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL		(0.0-0.5) CLAY; some roots; trace fine and medium sand; trace gravel to 15mm, angular; moist; stiff; slightly plastic; 10YR3/2 very dark grayish brown.					
1	-1	FL			Rad gamma bkg cpm		PVSB0163	0-4'	1348 Sample PVSB0163 collected 0.5-1.5' bgs for RAD analysis.
2	-2			(0.5-1.5) FILL MATERIAL - CLAY; wood pieces; gravel; some fine to coarse sand; dry; stiff; non-plastic; 10YR4/4 dark yellowish brown.					One boring needed to collect all samples.
3	-3	CL			PID 0 ppm			1.8'	
4	-4			(1.5-4.2) Silty CLAY; trace fine sand; trace rootlets; trace gravel to 10mm, subangular; 10YR4/1 dark gray mottled with 10YR5/6 yellowish brown.					
5	-5	CL		(4.2-6.8) CLAY; trace fine sand; trace gravel to 10mm, subangular; moist; stiff; medium plastic; 10YR5/8 yellowish brown mottled with 10YR4/6 dark yellowish brown and 10YR5/2 grayish brown.	Rad gamma bkg cpm			4-8'	
6	-6								
7	-7			(6.8-10.3) Shelby tube collected. Material appears to be the same as above.	PID 0 ppm			2.8'	
8	-8				Rad gamma bkg cpm				
9	-9	CL				PVSB0164		8-10.5'	1355 Sample PVSB0164 collected 8.0-10.3' bgs for geotechnical.
10	-10				PID 0 ppm			2.3'	
11	-11			Bottom of Boring @ 10.3' bgs.					
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 6,500 cpm
16	-16								
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0002

Painesville Site IARP	: SB0002
Start Date	: 09/11/00
End Date	: 09/11/00
Northing Coord.	: 232700.16 State Plane
Easting Coord.	: 705238.83 Meters NAD 83
Total Depth of Boring	: 6.4 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL		(0.0-0.6) Silty CLAY; trace roots in upper 0.2'; trace fine sand; trace gravel to 8mm, subangular; moist; very stiff; slightly plastic; 10YR4/4 dark yellowish brown.					
		ML		(0.6-0.8) SILT; some fine to medium sand; moist; very stiff; non-plastic; 10YR3/1 very dark gray.					
1	-1	FL		(0.8-1.3) FILL MATERIAL - Slag, rock, concrete; material from rubble pile.	Rad gamma 9800 cpm			0-4'	
2	-2	ML		(1.3-2.7) Clayey SILT; some fine sand; moist; dense; slightly plastic; 10YR3/3 dark brown mottled with 10YR4/1 dark gray.			PVSB0166		0950 Sample PVSB0166 collected 1.5-2.5' bgs for RAD, TAL, & TCl analyses.
3	-3	CL		(2.7-6.4) Silty CLAY; trace fine sand; moist; stiff, soft in places; very plastic; 10YR5/6 yellowish brown mottled with 10YR5/1 gray.	PID 0 ppm			3.0'	One boring needed to get to depth.
4	-4								
5	-5				Rad gamma 5500 cpm			4-7.5'	
6	-6								
7	-7			Bottom of Boring @ 6.4' bgs.	PID 0 ppm			2.4'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 9,500 cpm
16	-16								0933 Begin drilling 0955 Finish with boring moving to next location.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
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Painesville FUSRAP Site
USACE - Buffalo District
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Painesville, Ohio

Soil Boring IARP-SB0003

Painesville Site IARP	: SB0003
Start Date	: 09/11/00
End Date	: 09/11/00
Northing Coord.	: 232695.75 State Plane
Easting Coord.	: 705234.91 Meters NAD 83
Total Depth of Boring	: A-5.7/B-4.0/C-3.0 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL FL		(0.0-0.4) CLAY; trace fine to medium sand; trace gravel to 20mm, angular; moist; stiff; medium plastic; 10YR4/2 dark grayish brown.	Rad gamma A 10000 cpm C 5500 cpm				
1	-1	FL		(0.4-0.6) FILL MATERIAL - Concrete rubble.				A 0-4' B 0-4' C 0-4'	
2	-2			(0.6-2.0) FILL MATERIAL - Cinders, brick, block glaze; moist; dense; non-plastic.			PVSB0169		1115 Sample PVSB0169 collected 1.25-2.25' bgs for RAD analysis.
3	-3				PID 0 ppm			A 2.0' B NR C 3.0'	Three borings needed to get to depth.
4	-4	FL		(2.0-5.7) Same as above except wet.					
5	-5				Rad gamma 9600 cpm			A 4-8'	
6	-6			Bottom of SB0003A @ 5.7' bgs.					
7	-7				PID 0 ppm			A 1.7'	
8	-8			No description for SB0003B					
9	-9								
10	-10	FL		(0.0-0.75) CLAY; some roots; brick, concrete; trace fine sand; moist; stiff; slightly plastic; 10YR3/2 very dark grayish brown.					RAD BKG gamma = 8,000 cpm reestablished bkg 8800 cpm RAD bkg for 3rd boring gamma = 13,500 cpm
11	-11	FL		(0.75-1.25) Pea GRAVEL; 10YR6/4 light yellowish brown.					
12	-12	CL		(1.25-2.2) Silty CLAY; trace fine sand; moist to dry; soft; non-plastic; 10YR4/3 brown.					0957 Begin Drilling 1005 Rad high enough that works needs to be conducted in tyvek. 1037 After review, no tyvek is to be worn. Refusal at 7.0' bgs.
13	-13	CL		(2.2-3.0) CLAY; trace fine sand; moist; stiff; medium plastic; 10YR5/6 yellowish brown mottled with 10YR5/1 gray.					
14	-14								
15	-15			Bottom of SB0003C @ 3.0' bgs.					1100 Refusal in 2nd hole at 4'. Move forward again. 1109 Finish boring.
16	-16								
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0004

Painesville Site IARP	: SB0004
Start Date	: 09/11/00
End Date	: 09/11/00
Northing Coord.	: 232690.35 State Plane
Easting Coord.	: 705241.28 Meters NAD 83
Total Depth of Boring	: 6.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0								
1	-1	FL		(0.0-1.6) FILL MATERIAL - CLAY; trace roots; brick, concrete; trace fine sand; moist; stiff; slightly plastic; 10YR3/2 very dark grayish brown.	Rad gamma 7500 cpm			0-4'	1145 Sample PVSB0172 collected 2.0-2.9' bgs for RAD analysis.
2	-2	FL		(1.5-2.0) FILL MATERIAL - Fire Brick.					One boring needed to get to depth.
		CL		(2.0-2.5) CLAY; trace fine sand; moist to dry; stiff; non-plastic; 10YR4/3 brown.			PVSB0172		
3	-3	CL		(2.5-6.5) CLAY; trace fine sand; moist to dry; stiff; medium plastic; 10YR5/6 yellowish brown mottled with 10YR5/1 gray.	PID 0 ppm			2.9'	
4	-4								
5	-5				Rad gamma 9600 cpm			4-8'	
6	-6								
7	-7			Bottom of Boring @ 6.5' bgs.	PID 0 ppm			2.5'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 11,000 cpm
16	-16								1130 Begin drilling 1145 Finish drilling
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0005

Painesville Site IARP	: SB0005
Start Date	: 09/11/00
End Date	: 09/11/00
Northing Coord.	: 232688.21 State Plane
Easting Coord.	: 705256.36 Meters NAD 83
Total Depth of Boring	: 6.75 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL		(0.0-0.4) Silty CLAY; trace fine sand; trace roots; moist; medium stiff; slightly plastic; 10YR4/4 dark yellowish brown.					
1	-1	FL		(0.4-4.0) FILL MATERIAL - CLAY; brick, concrete; fine to coarse sand; 10YR4/3 brown.	Rad gamma 9600 cpm		PVSB0175	0-4'	1215 Sample PVSB0175 collected 2.0-2.9' bgs for RAD, TAL, & TCL analyses. One boring needed to get to depth.
2	-2								
3	-3				PID 0 ppm			1.75'	
4	-4	CL		(4.0-6.75) CLAY; trace fine sand; moist; very stiff; plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/8 yellowish brown and 10YR5/1 gray.					
5	-5				Rad gamma 9600 cpm			4-8'	
6	-6								
7	-7			Bottom of Boring @ 6.75' bgs.	PID 0 ppm			2.75'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 9,400 cpm
16	-16								1155 Setup on boring and begin drilling
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
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Painesville FUSRAP Site
USACE - Buffalo District
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Painesville, Ohio

Soil Boring IARP-SB0006

(Page 1 of 1)

Painesville Site IARP	: SB0006
Start Date	: 09/11/00
End Date	: 09/11/00
Northing Coord.	: 232690.98 State Plane
Easting Coord.	: 705260.28 Meters NAD 83
Total Depth of Boring	: 10.2 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0								
1	-1	FL		(0.0-1.5) RUBBLE PILE - Silty CLAY; some fine to very coarse sand; trace roots; moist; very stiff 0.5-1.0, loose 1.0-1.5; 10YR3/3 dark brown 0.0-0.5, 10YR5/2 grayish brown 0.5-1.0, and 10YR5/3 brown 1.0-1.5.	Rad gamma 9400-10000 cpm		PVSB0178	0-4'	1429 Sample PVSB0178 collected 1.5-2.6' bgs for RAD, TAL, & TCL analyses and MS/MSD.
2	-2	FL		(1.5-2.6) FILL MATERIAL - Silty CLAY; some fine to coarse sand; some concrete pieces; moist; soft to medium stiff; slightly plastic; 10YR4/3 brown.					
3	-3				PID 0 ppm			2.6'	
4	-4			(2.6-10.2) CLAY; trace fine sand; moist to dry; very stiff; medium plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/6 yellowish brown and 10YR5/1 gray.					
5	-5				Rad gamma 9400-10000 cpm			4-8'	
6	-6	CL							
7	-7				PID 0 ppm			3.1'	
8	-8								
9	-9					PVSB0179			1430 Sample PVSB0179 colected 8.0-10.2' bgs for geotechnical.
10	-10			Bottom of Boring @ 10.2' bgs.					Two borings needed to get enough sample volume.
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 8,800 cpm
16	-16								1407 Setup on boring and begin drilling. 1426 Setting up to collect shelby tube. 1450 Done
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0007

(Page 1 of 1)

Painesville Site IARP	: SB0007
Start Date	: 09/11/00
End Date	: 09/11/00
Northing Coord.	: 232695.18 State Plane
Easting Coord.	: 705263.10 Meters NAD 83
Total Depth of Boring	: 6.8 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-1.0) RUBBLE PILE - Silty CLAY; some fine to very coarse sand; trace roots; concrete pieces; 10YR3/3 dark brown.	Rad gamma bkg cpm				
1	-1	FL		(1.0-2.0) FILL MATERIAL - Silty CLAY; some brick and concrete pieces; moist; medium stiff; slightly plastic; 10YR4/3 brown.			PVSB0181	0-4'	1520 Sample PVSB0181 collected 1.0-2.0' bgs for RAD analysis.
2	-2	CL		(2.0-6.8) CLAY; trace fine sand; moist to dry; very stiff; medium plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/6 yellowish brown and 10YR5/1 gray.					
3	-3				PID 0 ppm			3.0'	One boring needed to get to depth.
4	-4								
5	-5				Rad gamma bkg cpm			4-8'	
6	-6								
7	-7			Bottom of Boring @ 6.8' bgs.	PID 0 ppm			2.8'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 12,400 cpm
16	-16								1500 Setup on boring. 1520 Finish with boring.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0008

(Page 1 of 1)

Painesville Site IARP	: SB0008
Start Date	: 09/11/00
End Date	: 09/11/00
Northing Coord.	: 232716.53 State Plane
Easting Coord.	: 705257.53 Meters NAD 83
Total Depth of Boring	: 9.5 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	FL		(0.0-0.5) RUBBLE PILE - CLAY; some fine to very coarse sand; trace roots; concrete and brick pieces; 10YR3/3 dark brown.					
1	-1	FL			Rad gamma bkg cpm			0-4'	
2	-2			(0.5-2.3) FILL MATERIAL - Silty CLAY; some brick and concrete pieces; moist; medium stiff; slightly plastic; 10YR4/3 brown.			PVSB0184		1608 Sample PVSB0184 collected 1.3-2.3' bgs for RAD analysis.
3	-3	CL		(2.3-9.5) Native Material - CLAY; trace fine sand; moist to dry; very stiff; medium plastic; 10YR4/6 dark yellowish brown mottled with 10YR5/6 yellowish brown and 10YR5/1 gray.	PID 0 ppm			3.3'	
4	-4								
5	-5				Rad gamma bkg cpm			4-8'	
6	-6								
7	-7				PID 0 ppm			2.1'	
8	-8								
9	-9					PVSB0185			1606 Sample PVSB0185 colected 8.0-9.5' bgs for geotechnical.
10	-10			Bottom of Boring @ 10.2' bgs.					
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 12,500 cpm
16	-16								1545 Setup and drilling.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0009

Painesville Site IARP	: SB0009
Start Date	: 09/12/00
End Date	: 09/12/00
Northing Coord.	: 232699.40 State Plane
Easting Coord.	: 705266.55 Meters NAD 83
Total Depth of Boring	: 6.8 feet

Drilling Company	: Double J Drilling
Driller	: Don Malone
Designation of Drill	: Diedrich
Type of Drill Rig	: Direct Push Technology
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 2.5 inches
Sampling Equipment	: 4' Sampling Tube 2.25" OD
SS Bowl & Spoon	: Acetate Liner

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL		(0.0-0.5) CLAY; some roots; trace fine sand; moist; medium stiff; medium plastic; 10YR3/3 dark brown.					
1	-1	FL		(0.5-1.5) FILL MATERIAL - Silty CLAY; fire brick, pieces of concrete; trace rootlets; moist; non-plastic; 10YR3/2 very dark grayish brown.	Rad gamma 10500 cpm		PVSB0187	0-4'	0850 Sample PVSB0187 collected 0.0-1.5' bgs for RAD analysis.
2	-2	CL		(1.5-2.0) Silty CLAY; trace fine sand; moist to dry; hard; non-plastic; 10YR4/4 dark yellowish brown.					One boring needed to get to depth.
3	-3				PID 0 ppm			2.6'	Boring location within 6" of 30K surface count. 24K at sample location.
4	-4	CL		(2.0-6.8) CLAY; trace fine to medium sand; moist; very stiff; medium plastic; 10YR5/4 yellowish brown mottled with 10YR5/6 yellowish brown and 1-YR5/1 gray.					
5	-5				Rad gamma 8000 cpm			4-8'	
6	-6								
7	-7			Bottom of Boring @ 6.8' bgs.	PID 0 ppm			2.8'	
8	-8								
9	-9								
10	-10								
11	-11								
12	-12								
13	-13								
14	-14								
15	-15								RAD BKG gamma = 30,000 cpm
16	-16								0836 Begin drilling. 0856 Finish boring moving to next location.
17	-17								
18	-18								
19	-19								All colors from Munsell Soil Color Chart 1992 Revised Edition
20									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0010

Painesville Site IARP	: SB0010
Start Date	: 09/12/00
End Date	: 09/12/00
Northing Coord.	: 232692.20 State Plane
Easting Coord.	: 705252.89 Meters NAD 83
Total Depth of Boring	: 2.0 feet

Drilling Company	: SAIC
Driller	:
Designation of Drill	: Hand Auger
Type of Drill Rig	:
Geologist	: Paul Parrish
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3.5 inches
Sampling Equipment	: 3.5" OD SS Hand Auger
	: SS Bowl & Spoon

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0	CL		(0.0-0.5) Silty CLAY; trace fine sand; moist; stiff; medium plastic; 10YR4/4 dark yellowish brown.	Rad gamma 10000 cpm		PVSB0190		
		CL		(0.5-0.7) CLAY; trace fine sand; 10YR5/6 yellowish brown mottled with 10YR5/1 gray and 10YR4/6 dark yellowish brown.					0850 Sample PVSB0187 collected 0.0-1.5' bgs for RAD analysis.
1	-1	FL		(0.7-2.0) FILL MATERIAL - Silty CLAY; trace fine sand; trace rootlets; trace gravel (concrete) to 15mm, pieces of coal, fire brick; moist; soft; slightly plastic; 10YR3/2 very dark grayish brown.	PID 74 ppm Downhole				Boring located in area of rubble pile where the ground surface is about the same elevation of area outside of the rubble pile.
2	-2			Bottom of Boring @ 2.0' bgs.					
3	-3								
4	-4								RAD BKG gamma = 12,000 cpm
5	-5				All Rad readings to 2' bgs 10000 +/- 200 cpm				1120 Setup to hand auger boring. 1145 Refusal in first boring, moved 6" west to try second boring. 1209 Finish at this location.
6	-6								Refusal in all 3 borings at approximately the same depth, 2'.
7	-7								
8	-8								
9	-9								All colors from Munsell Soil Color Chart 1992 Revised Edition
10									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0011

(Page 1 of 1)

Painesville Site IARP	: SB0011
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232706.77 State Plane
Easting Coord.	: 705262.21 Meters NAD 83
Total Depth of Boring	: 0.5 feet

Drilling Company	: SAIC
Driller	: Joe Schultheis
Designation of Drill	: Hand Auger
Type of Drill Rig	:
Geologist	: A. Brad Richardson
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3.5 inches
Sampling Equipment	: 3.5" OD SS Hand Auger
	: SS Bowl & Spoon

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0			Collected descrete RAD sample from top 6" of rubble pile, biasly selected using NaI 2X2 gamma detector. "Cuttings" are demolition debris (concrete, brick, etc.). Bottom of Boring @ 0.5' bgs.			PVSB0191		Sample PVSB0191 collected 0.0-0.5' bgs for RAD analysis. Surface gamma @ 57K cpm Note: the entire pile where SB0011 is located appears to be hot (20K or more). Take one minute integrated gamma count with 2"X2" (NaI) 15 feet away from east edge = 7556 cpm 0-6" integr. gamma count (probe immersed in soil in bowl where background count was made) = 19,798 cpm.
1	-1								
2	-2								
3	-3								
4	-4								
5	-5								
6	-6								
7	-7								
8	-8								
9	-9								
10									

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Soil Boring IARP-SB0012

(Page 1 of 1)

Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Painesville Site IARP	: SB0012
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232697.07 State Plane
Easting Coord.	: 705259.15 Meters NAD 83
Total Depth of Boring	: 0.5 feet

Drilling Company	: SAIC
Driller	: Joe Schultheis
Designation of Drill	: Hand Auger
Type of Drill Rig	:
Geologist	: A. Brad Richardson
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3.5 inches
Sampling Equipment	: 3.5" OD SS Hand Auger
	: SS Bowl & Spoon

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0			Collected descrete RAD sample from top 6" of rubble pile, biasly selected using NaI 2X2 gamma detector. "Cuttings" are demolition debris (concrete, brick, etc.). Bottom of Boring @ 0.5' bgs.			PVSB0192		Sample PVSB0192 collected 0.0-0.5' bgs for RAD analysis. Surface gamma @ 116K cpm Note: the entire pile where SB0012 is located appears to be hot (20K or more). Take one minute integrated gamma count with 2"X2" (NaI) 15 feet away from east edge = 7556 cpm 0-6" integr. gamma count (probe immersed in soil in bowl where background count was made) = 35,780 cpm.
1	-1								
2	-2								
3	-3								
4	-4								
5	-5								
6	-6								
7	-7								
8	-8								
9	-9								
10									

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Painesville FUSRAP Site
USACE - Buffalo District
Uniroyal Chemical Co.
Painesville, Ohio

Soil Boring IARP-SB0013

(Page 1 of 1)

Painesville Site IARP	: SB0013
Start Date	: 09/15/00
End Date	: 09/15/00
Northing Coord.	: 232698.27 State Plane
Easting Coord.	: 705260.63 Meters NAD 83
Total Depth of Boring	: 0.5 feet

Drilling Company	: SAIC
Driller	: Joe Schultheis
Designation of Drill	: Hand Auger
Type of Drill Rig	:
Geologist	: A. Brad Richardson
Depth to Bedrock	: Not Encountered
Depth Drilled Into Rock	: NA
Borehole Diameter	: 3.5 inches
Sampling Equipment	: 3.5" OD SS Hand Auger
	: SS Bowl & Spoon

Depth in feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Field Screening Results	GEOTECH Sample	Lab No.	Core Recovery	REMARKS
0	0			Collected descrete RAD sample from top 6" of rubble pile, biasly selected using NaI 2X2 gamma detector. "Cuttings" are demolition debris (concrete, brick, etc.).			PVSB0193		Sample PVSB0193 collected 0.0-0.5' bgs for RAD analysis.
				Bottom of Boring @ 0.5' bgs.					Surface gamma @ 60K cpm Note: the entire pile where SB0013 is located appears to be hot (20K or more).
1	-1								
2	-2								Take one minute integrated gamma count with 2"X2" (NaI) 15 feet away from east edge = 7556 cpm
3	-3								0-6" integr. gamma count (probe immersed in soil in bowl where background count was made) = 11,980 cpm.
4	-4								
5	-5								
6	-6								
7	-7								
8	-8								
9	-9								
10									

APPENDIX F

Data Quality Assessment Report

Painesville FUSRAP Site RI/FS

APPENDIX F

TABLE OF CONTENTS

LIST OF TABLES

F.1.0 INTRODUCTION

This data quality assessment describes the evaluation of the data quality indicators (DQIs) that were used to assess the overall quality of the analytical data collected for the USACE Painesville Focused RI. The DQIs (accuracy, precision, completeness, representativeness, and comparability) are assessed with respect to the project data quality objectives (DQOs). Project DQOs establish the data end uses and end users and provide objective criteria by which the data quality can be measured. More importantly, The DQO process identifies the up front protocols, processes, procedures, and methods by which the DQOs can be met. With the appropriate planning for project DQOs, their achievement provides the basis for concluding that the acquired investigation data is scientifically sound, legally defensible, and adequate for their intended use.

The specific DQOs for accuracy, precision, completeness, representativeness, and comparability were established in the project-planning phase. DQOs may be qualitative statements, while others set quantitative criteria or goals. Both are evaluated in this data quality assessment. The numerical DQOs will be presented in Tables in the revised draft. Accuracy, precision, completeness, representativeness and comparability are defined in section F.2.0

The Painesville Focused RI sampling and analysis was conducted using the Quality Control (QC) requirements and Quality Assurance (QA) objectives as outlined in the Painesville Work Plan (WP), Sampling and Analysis Plan (SAP), and the Quality Assurance Project Plan (QAPP). Samples were analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), pesticides/PCBs, target analyte list (TAL-metals and cyanide), and various radiochemical constituents. In addition, selected samples were also analyzed for various geotechnical methods.

F.1.1 ENVIRONMENTAL ANALYTICAL LABORATORIES

Environmental and field QC samples were analyzed for radiochemical parameters by Eberline Services (formerly Thermo Retech), and their subcontracted chemical laboratory Lionville Laboratory Inc. (formerly RECRA Labnet), for the Painesville Focused RI. Environmental samples were analyzed by General Engineering Laboratory for geotechnical data. The laboratories analyzed all environmental samples and field QC samples using accepted laboratory SOPs based on EPA, DOE, and ASTM methods from the following references:

- *EML Procedures Manual HASL-300*, 1982;
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, September 1986, and current revisions (Update III); and
- *Prescribed Procedures for Measurement of Radioactivity in Drinking Water (900 series), USEPA, August 1980*.

F.1.2 ANALYTICAL DATA VALIDATION

F.1.2.1 Data Validation Resources

Analytical data were independently validated for adherence to method QA/QC criteria by SAIC using the guidelines and specifications described in the following documents:

- *National Functional Guidelines for Organic Data Review, Multi-Media, Multi-Concentration*, December 1990, Revised October 1999;
- *Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses*, February 1988, Revised February 1994; and
- *SAIC Quality Assurance Technical Procedures; Volume I, Data Management:Data Validation Procedure*, Revision 3, September 1996.

All data received from the laboratories were subjected to an initial review to ensure that all elements of the required deliverable were submitted. For 10% of the investigation data, review items included, but was not limited to case narratives, chain of custody, detection limits, blanks, and QC Summaries. These items were reviewed in accordance with the above referenced data validation procedures.

F.1.2.2 Data Validation Results

Data validation qualifiers that resulted from the validation process were documented and incorporated into the Painesville database and used to evaluate the data quality. A 10% level for data validation is believed to be sufficient to find any systematic problems within the laboratory. The validation task was designed to be inclusive of all facets of the laboratory operation from sample receipt to final data reporting (hard copy and electronic data deliverable or EDD). No systematic problems were noted during the data validation effort. The data validation process resulted in only minor qualifications of the data.

F.1.3 QUALITY DATA MANAGEMENT

The Painesville database was populated with analytical results from samples collected during the Painesville Focused RI In certain cases, data were selected for incorporation into or exclusion from the database (i.e., 2 results from the same sampling point). The selection processes are described below:

- All laboratory and field QC results were marked to prevent incorporation into the usable data population.
- All duplicate values (same sample location) were identified with a unique sample ID to prevent incorporation into the usable data population.
- All dilutions results were evaluated for best value and detection limit using the following procedure: 1) The diluted sample results were selected for all compounds which exceeded the analytical calibration range in the original data set, 2) The nondiluted sample results were selected for all target compounds reported within the calibration range and 3) The most sensitive detection limit (the nondiluted or original sample) was selected for undetected compounds.
- All reanalysis results were evaluated for best value, based on QC results, established criteria, detection limit, and professional judgement.

F.2.0 DATA QUALITY OBJECTIVES

As defined in the Quality Assurance Project Plan (QAPP), the following specific DQOs for accuracy, precision, completeness, representativeness and comparability were used to assess the overall quality of the analytical data collected from the Painesville Focused RI.

Numerical DQOs for accuracy and precision are listed in Tables F.4.3.1.1 through F.5.3.3. These criteria were applied to the laboratory chemical and radiochemical QC analyses conducted during the Painesville Focused RI. The project QC data is tabulated as to the amount of data observed within the criteria, the amount of data below the criteria, and the amount of data above the criteria. This provides the main point of reference for an assessment of the Painesville Focused RI environmental database as a whole.

F.2.1 ACCURACY

Accuracy is defined as the extent of agreement between a measured or calculated value and the true value. Accuracy was determined for the Painesville project using spike percent recovery data from matrix spike/matrix spike duplicate (MS/MSD) samples and laboratory control samples (LCSs). DQOs for accuracy were met for the project.

F.2.2 PRECISION

Precision is defined as the reproducibility, or degree of agreement, among replicate measurements of the same compound or element analyzed under identical conditions. Precision is expressed as relative percent difference (RPD) between the two results. The precision DQOs for Painesville were met.

F.2.3 COMPLETENESS

Completeness for the Painesville Focused RI is defined as the usable data acquired, and is expressed as a percentage of the planned valid data. Completeness determinations are made separately for samples obtained from the field collection effort and data obtained from the analytical measurement system.

F.2.4 REPRESENTATIVENESS

Representativeness is defined as the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling location, a process condition, or an environmental condition. Sample representativeness was ensured during the Painesville Focused RI by collecting sufficient samples of a population medium, properly distributed with respect to location. Representativeness, in part, was accomplished by the consistent use of approved drilling techniques, sample collection methods, equipment, and sample containers for the Painesville Focused RI field work. Representativeness was also assessed by evaluating the RPD values calculated from the field duplicate samples, duplicate concentration values reported from redundant analyses, and the concentrations of contaminants detected in the field and laboratory QC blanks. The reproducibility of a representative set of samples reflects the degree of homogeneity of the sampled medium.

F.2.5 COMPARABILITY

Comparability is defined as the confidence with which one data set can be compared to another. To achieve data comparability, the data set used for the Painesville Focused RI was generated by employing standardized analytical methods and standardized data validation procedures. Also, the project planning, including lab selection, used various appropriate EPA and USACE guidance documents.

Additionally, the laboratories participated in the analysis of Performance Evaluation (PE) samples. for organics, inorganics and radionuclides. The laboratory performance during the period the Painesville Focused RI analytical testing was conducted indicates their ability to generate accurate results over time. Based on the overall quality of the PE sample results, and the stringent QC requirements set by the standardized methods, the data generated is considered comparable to other data generated through similar processes.

F.3.0 DATA QUALITY ASSESSMENT

Environmental samples were collected and analytical data evaluated during the Painesville Focused RI to support technical conclusions and recommendations. These data (e.g., concentration values and laboratory qualifiers) were incorporated into one database. Hard copy data packages were submitted to the data validators for validation. The qualifiers applied to estimated data points were incorporated into the database once the qualified results were reviewed. A compilation of the sample analytical results for radionuclide parameters and associated qualifiers is presented in Appendix G. The usable data population was then determined using the preparation and selection process described in Section F.1.3

F.3.1 DATA VALIDATION PROCESS

Analytical data were validated according to the guidelines and procedures described in the documents listed in Section F.1.2.1. The validators were responsible for (1) reviewing the laboratory data packages and applying the required control limits (obtained from references listed in section F.1.2.1) (2) using professional judgment where specific limits were not specified, (3) qualifying affected data points on the applicable result forms, and, (4) preparing a data validation report for actions taken.

F.3.2 DATA VALIDATION REVIEW PROCESS

Analytical data received from the data validators were reviewed before the validation qualifiers were incorporated into the Painesville Focused RI database. The validation results were reviewed for consistency, completeness, and to resolve any questions. After the validation qualifiers were incorporated into the database an output report was printed and compared to the input data. All changes were documented and incorporated into the Painesville Focused RI database as the final qualifiers.

F.3.3 DATA BIAS ASSESSMENT

The data quality assessment was conducted using the Painesville Focused RI QC data (organized by parameter) and the data validation results. The QC data was evaluated for the number of results observed within the set acceptance criteria, lower than the criteria or higher than the criteria. When the data is observed as lower or higher than the criteria, there is a bias.

Overall bias for the Painesville Focused RI is as follows: Approximately 3.2% are considered to have been reported at an artificially lower concentration (i.e., potentially biased low). Approximately 1.8% of the

Painesville Focused RI data are considered to have been reported at a maximum value (i.e., potentially biased high). The remaining 95% are considered to have negligible bias (they are within the QC acceptance criteria).

F.4.0 LABORATORY QUALITY CONTROL SUMMARY

F.4.1 CONTRACT-REQUIRED HOLDING TIMES

Holding times are defined as the maximum amount of time allowed to elapse between the date and time of sample collection and the date and time of sample analysis. Analysis of samples that have exceeded the method-recommended holding times may result in the following: 1) concentrations of compounds that ordinarily would have been detected are undetected due to chemical transformation, compound volatilization, or biodegradation; 2) reported concentrations lower than those originally present, due to the factors previously stated; or 3) reported concentrations greater than those originally present in the sample, due to external contamination of water samples or changes in soil moisture content. No data was rejected due to holding time violations.

F.4.2 COMPLETENESS

The project completeness goal was 90 percent and the analytical completeness goal was 95%. Analytical completeness was calculated by adding the number of samples collected for any analysis, subtracting the number of sample analyses that were rejected, and dividing that number by the total samples collected. No sample analyses were rejected, therefore the analytical completeness was 100% for all methods.

F.4.3 ACCURACY AND PRECISION

Laboratory accuracy and precision assessment and sample matrix effect evaluation was conducted using LCS/LCSDs and MS/MSDs. Accuracy and precision were expressed as the percent recovery (%R) of the spike compounds, elements or isotopes and the RPD of the concentrations of the spike compounds, respectively. Accuracy and precision criteria are provided along with all QC results in Tables F.4.3.1.1 through F.5.2.3. For samples collected and analyzed as field duplicates, precision was expressed as the percent difference of the concentration of elements detected in the sample and associated duplicate. As with MS/MSDs, the field duplicate data served as indications of the matrix sampled and precision in the analytical system. An MS/MSD or a spike and analytical duplicate analysis was required for every 20 samples of a similar matrix. Field duplicates where collected at a 10% frequency.

F.4.3.1 Volatile Organic Compound Analyses

Five soil LCSs were analyzed for VOCs. All LCS results were within the specified QC limits. Four soil samples were analyzed as MS/MSDs using USEPA SW-846 method 8260. These samples were spiked with the following compounds: 1,1-dichloroethene, trichloroethene, benzene, toluene, and chlorobenzene. One hundred percent of the duplicate RPDs were within the acceptance criteria. The analytical accuracy and precision results for MS/MSDs and LCSs are summarized in Tables F.4.3.1.1 and F.4.3.1.2.

F.4.3.2 Semivolatile Organic Compound Analyses

Five soil LCSs were analyzed for SVOCs. All LCS results were within the specified limits. Two soil samples were analyzed as MS/MSDs using USEPA SW-846 method 8270. These samples were spiked with the following compounds: phenol, 2-chlorophenol, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, 4-chloro-3-methlyphenol, acenaphthene, 4-nitrophenol, 2,4-dinitrotoluene, pentachlorphenol, and pyrene. For soil samples, 92.5% of the duplicate RPDs were within the acceptance criteria. The analytical accuracy and precision results for MS/MSDs and LCSs are summarized in Tables F.4.3.2.1 and F.4.3.2.2.

F.4.3.3 Pesticide Compound Analyses

Twelve soil LCSs were analyzed for pesticides. All LCS results were within the specified QC limits except for endrin which was slightly high in one LCS. These samples were spiked with the following compounds: g-BHC (Lindane), heptachlor, aldrin, dieldrin, endrin, and 4,4'-DDT. Ninety-six percent of the duplicate RPDs were within the acceptance criteria. The analytical accuracy and precision results for LCSs are summarized in Tables F.4.3.3.1 and F.4.3.3.2.

F.4.3.4 PCB Compound Analyses

Fourteen LCSs were analyzed for PCBs. All LCS results were within the specified QC limits. These samples were spiked with the following compound: aroclor (PCB) 1254. One hundred percent of the duplicate RPDs were within the acceptance criteria. The analytical accuracy and precision results for LCSs are summarized in Tables F.4.3.3.1 and F.4.3.3.2.

F.4.3.5 Inorganic Chemical Analyses

Two soil LCSs were analyzed for TAL metals and cyanide. All LCS results were within the specified limits. Two soil samples were analyzed as matrix spikes (MSs) and sample duplicates (SDs) using USEPA

SW-846 method 6010, and cold vapor analysis for mercury. For soil samples, 90.5% of the duplicate RPDs were within the acceptance criteria. The analytical accuracy and precision results for MSs, SDs and LCSs are summarized in Tables F.4.3.5.1 and F.4.3.5.2.

F.4.3.6 Radiochemical Analyses

Ten soil LCSs were analyzed for specified radiochemical constituents or isotopes. The soil radiochemical QC isotopes are cobalt-60 and cesium-137 (gamma), thorium-228, 230, and 232, and uranium-234, and 238 (alpha spec.). All LCS results were within the specified limits except for uranium-234 which had a slightly high % recovery in 3 samples and uranium-238 which had a slightly high % recovery in 2 samples. Ten soil samples were analyzed as SDs using the referenced methods for radiochemical analyses. For soil samples, 88.4% of the duplicate RPDs were within the acceptance criteria. The analytical accuracy and precision results for SDs and LCSs are summarized in Tables F.4.3.6.1 and F.4.3.6.2.

F.4.4 REPRESENTATIVENESS

Representativeness was ensured by conducting all field measurements, sample collection procedures, and laboratory analyses according to the guidelines and specifications described in the Painesville Focused RI Work Plan, QAPP, and Laboratory QAPP. Laboratory procedures were evaluated prior to shipping samples and also during the data validation process. The data set is considered representative of site conditions for the purpose of the Painesville Focused RI.

F.5.0 FIELD QUALITY CONTROL SUMMARIES

Trip blanks and field duplicates were collected and analyzed for the same target compounds or elements and using the same laboratory techniques as those used for the environmental samples. Blanks were assessed as part of the data validation process and results were qualified where appropriate.

F.5.1 TRIP BLANKS

Trip blanks monitor for VOC contamination during sample transport and storage. Trip blanks were prepared by the laboratory with American Society for Testing and Materials (ASTM) Type II water, stored with the unused sample bottles, and returned to the laboratory with each cooler containing VOC samples. If the concentrations of the compounds detected in the environmental samples did not exceed 10 times (for methylene chloride, acetone, 2-butanone, and toluene) or 5 times (for all other compounds) that detected in the trip blank, the compound was considered not detected (i.e. qualified as U) in the environmental sample at the concentrations reported.

F.5.2 FIELD REPLICATES

Replicate environmental samples were collected at selected locations to evaluate the precision of the sampling techniques. The RPD value of each detected compound or element was reviewed to assess the sample collection reproducibility and matrix variability. Where good field techniques are consistently implemented and matrix effects are minimum, the RPDs are expected to be low.

Eighty two percent of the field duplicate RPDs for organic results in soil were within acceptance criteria. Eighty six percent of the field duplicate RPDs for metal results in soil were within acceptance criteria. Eighty nine percent of the field duplicate RPDs for radiochemistry results in soil were within acceptance criteria. Many of these samples also serve to indicate good analytical precision was achieved. Tables F.5.2.1 through F 5.2.3 summarize the calculated RPD values and RPD criteria (<50% for soil) for these field duplicate samples collected and analyzed for TCL organic compounds, TAL metals and radiochemical results.

F.6.0 DATA QUALITY ASSESSMENT SUMMARY

The overall findings of the DQA is as follows: (1) the data validation process found no systematic problem and produced minor qualifications of the results , (2) completeness for the Painesville Focused RI is > 99%, (3) overall project accuracy is acceptable, (4) overall analytical precision is acceptable, (5) overall field duplicate precision is acceptable, (6) documented representativeness was achieved for the Painesville Focused RI, and (7) documented comparability was achieved for the Painesville Focused RI. DQIs were found to be sufficiently in control. All project DQOs were met. This DQA provides the foundational information to conclude that the investigation data acquired for the USACE Painesville Focused RI is scientifically sound, legally defensible and adequate for their intended use.

Table F.4.3.1.1 Volatile Organic Compounds Accuracy Summary – Soil Samples

Analyte	Number of QA/QC Samples	Number within Limits	Minimum % Recovery	Maximum % Recovery	Limits
Matrix Spike (MS) Samples					
1,1-Dichloroethene	4	1	54	60	59-172
Trichloroethene	4	2	53	70	62-137
Benzene	4	4	71	85	66-142
Toluene	4	4	64	80	59-139
Chlorobenzene	4	4	61	81	60-133
Laboratory Control Samples (LCSs)					
1,1-Dichloroethene	5	5	76	101	59-172
Trichloroethene	5	5	90	112	62-137
Benzene	5	5	98	115	66-142
Toluene	5	5	99	117	59-139
Chlorobenzene	5	5	96	117	60-133

Table F.4.3.1.2 Volatile Organic Compounds Precision Summary – Soil Samples

MS/MSD Analyte	Number of QA/QC Pairs	Number within Limits	Maximum % RPD	Limits
1,1-Dichloroethene	2	2	8	22
Trichloroethene	2	2	9	24
Benzene	2	2	5	21
Toluene	2	2	9	21
Chlorobenzene	2	2	12	21

Table F.4.3.2.1 Semivolatile Organic Compounds Accuracy Summary - Soil Samples

Analyte	Number of QA/QC Samples	Number within Limits	Minimum % Recovery	Maximum % Recovery	Limits
Matrix Spike (MS) Samples					
Phenol	2	2	51	57	26-90
2-Chlorophenol	2	2	67	74	25-102
1,4-Dichlorobenzene	2	2	60	63	28-104
1,2,4-Trichlorobenzene	2	2	55	65	38-107
4-Chloro-3-methylphenol	2	1	27	57	26-103
Acenaphthene	2	2	65	71	31-137
4-Nitrophenol	NR	NR	NR	NR	11-114
2,4-Dinitrotoluene	2	1	28	41	28-89
Pentachlorophenol	2	2	37	54	17-109
Pyrene	2	2	80	104	35-142
Laboratory Control Samples (LCSs)					
Phenol	14	14	37	87	26-90
2-Chlorophenol	14	14	41	85	25-102
1,4-Dichlorobenzene	14	14	36	73	28-104
1,2,4-Trichlorobenzene	14	14	39	83	38-107
4-Chloro-3-methylphenol	14	14	40	90	26-103
Acenaphthene	14	14	46	82	31-137
4-Nitrophenol	14	14	35	105	11-114
2,4-Dinitrotoluene	14	14	44	86	28-89
Pentachlorophenol	14	14	46	104	17-109
Pyrene	14	14	58	99	35-142

NR = Not Reported

Table F.4.3.2.2 Semivolatile Organic Compounds Precision Summary – Soil Samples

MS/MSD **Analyte**	**Number of QA/QC Pairs**	**Number within Limits**	**Maximum % RPD**	**Limits**
Phenol	1	1	11	35
2-Chlorophenol	1	1	10	50
1,4-Dichlorobenzene	1	1	4	27
1,2,4-Trichlorobenzene	1	1	16	23
4-Chloro-3-methylphenol	1	0	71	33
Acenaphthene	1	1	8	19
4-Nitrophenol	NR	NR	NR	50
2,4-Dinitrotoluene	1	1	38	47
Pentachlorophenol	1	1	37	47
Pyrene	1	1	26	36

NR = Not Reported

Table F.4.3.2.2 Semivolatile Organic Compounds Precision Summary - Soil Samples

LCS/LCSD **Analyte**	**Number of QA/QC Pairs**	**Number within Limits**	**Maximum % RPD**	**Limits**
Phenol	4	4	35	35
2-Chlorophenol	4	4	42	50
1,4-Dichlorobenzene	4	3	50	27
1,2,4-Trichlorobenzene	4	3	46	23
4-Chloro-3-methylphenol	4	4	27	33
Acenaphthene	4	3	34	19
4-Nitrophenol	4	4	28	50
2,4-Dinitrotoluene	4	4	21	47
Pentachlorophenol	4	4	30	47
Pyrene	4	4	22	36

Table F.4.3.3.1 Pesticide/PCB Compounds Accuracy Summary – Soil Samples

Analyte	Number of QA/QC Samples	Number within Limits	Minimum % Recovery	Maximum % Recovery	Limits
Laboratory Control Samples (LCSs)					
g-BHC (Lindane)	12	12	45	105	30-125
Heptachlor	12	12	50	120	37-126
Aldrin	12	12	50	105	27-133
Dieldrin	12	12	58	114	40-125
Endrin	12	11	70	138	45-130
4,4'-DDT	12	12	58	108	33-123
AROCLOR 1254	14	14	77	128	30-146

Table F.4.3.3.2 Pesticide/PCB Compounds Precision Summary – Soil Samples

LCS/LCSD Analyte	Number of QA/QC Pairs	Number within Limits	Maximum % RPD	Limits
g-BHC (Lindane)	4	4	43	50
Heptachlor	4	3	46	31
Aldrin	4	4	33	43
Dieldrin	4	4	36	38
Endrin	4	4	37	45
4,4'-DDT	4	4	36	50
AROCLOR 1254	4	4	15	50

Table F.4.3.5.1 Metals Accuracy Summary - Soil Samples
(Page 1 of 2)

Analyte	Number of QA/QC Samples	Number within Limits	Minimum % Recovery	Maximum % Recovery	Limits
Matrix Spike (MS) Samples – Soil					
Aluminum	--	--	--	--	--
Antimony	2	0	61.1	65.5	75-125
Arsenic	2	2	93.4	93.9	75-125
Barium	2	2	86.9	99.9	75-125
Beryllium	2	2	94.4	95.4	75-125
Cadmium	2	2	90.8	93.7	75-125
Calcium	2	0	61.2	142.1.4	75-125
Chromium	2	0	54.6	201.3	75-125
Cobalt	2	2	91.5	95.7	75-125
Copper	2	1	82.5	969.8	75-125
Iron	--	--	--	--	--
Lead	2	2	100.6	115.7	75-125
Magnesium	2	1	65.1	119.8	75-125
Manganese	2	0	-140.9	184.5	75-125
Mercury	2	2	118.3	120.1	75-125
Nickel	2	2	91.5	114.0	75-125
Potassium	2	2	76.5	104.9	75-125
Selenium	2	2	90.5	91.3	75-125
Silver	2	2	96.0	96.1	75-125
Sodium	2	2	98.0	99.5	75-125
Thallium	2	2	88.6	91.6	75-125
Vanadium	2	2	96.1	101.9	75-125
Zinc	2	1	-203.0	84.3	75-125
Cyanide	1	1	98.3	98.3	75-125

-- = Not Applicable

Table F.4.3.5.1 Metals Accuracy Summary - Soil Samples (continued)
(Page 2 of 2)

Analyte	Number of QA/QC Samples	Number within Limits	Minimum % Recovery	Maximum % Recovery	Limits
Laboratory Control Samples (LCSs) – Soil					
Aluminum	2	2	100.7	101.5	80-120
Antimony	2	2	97.7	98.2	80-120
Arsenic	2	2	95.2	96.0	80-120
Barium	2	2	99.3	100.0	80-120
Beryllium	2	2	97.2	100.8	80-120
Cadmium	2	2	98.0	101.6	80-120
Calcium	2	2	98.2	99.9	80-120
Chromium	2	2	99.6	102.8	80-120
Cobalt	2	2	99.1	102.5	80-120
Copper	2	2	99.7	100.8	80-120
Iron	2	2	99.2	102.6	80-120
Lead	2	2	97.3	99.4	80-120
Magnesium	2	2	101.0	101.6	80-120
Manganese	2	2	102.8	105.1	80-120
Mercury	2	2	111	113	80-120
Nickel	2	2	98.4	100.2	80-120
Potassium	2	2	98.9	100.3	80-120
Selenium	2	2	92.5	94.6	80-120
Silver	2	2	99.4	99.6	80-120
Sodium	2	2	96.5	96.9	80-120
Thallium	2	2	97.5	99.0	80-120
Vanadium	2	2	102.3	104.6	80-120
Zinc	2	2	97.8	99.9	80-120
Cyanide	6	6	95	119	80-120

-- = Not Applicable

Table F.4.3.5.2 Metals Lab Duplicate Precision Summary - Soil Samples

Analyte	Number of QA/QC Pairs	Number within Limits	Max % RPD	Limits
Aluminum	2	2	20.5	35
Antimony	2	2	39.8	35
Arsenic	2	2	12.0	35
Barium	2	2	27.6	35
Beryllium	2	2	16.0	35
Cadmium	1	1	11.5	35
Calcium	2	2	23.7	35
Chromium	2	1	85.7	35
Cobalt	2	2	5.4	35
Copper	2	2	21.3	35
Iron	2	2	5.6	35
Lead	2	2	15.1	35
Magnesium	2	2	22.1	35
Manganese	2	2	11.3	35
Mercury	2	2	24.2	35
Nickel	2	2	31.6	35
Potassium	2	2	27.2	35
Selenium	1	1	12.7	35
Silver	--	--	--	--
Sodium	2	2	11.7	35
Thallium	--	--	--	--
Vanadium	2	2	7.2	35
Zinc	2	1	55.7	35
Cyanide	--	--	--	--

-- = Not Applicable

Table F.4.3.6.1 Radiochemicals Accuracy Summary – Soil Samples

Analyte	Number of QA/QC Samples	Number within Limits	Minimum % Recovery	Maximum % Recovery	Limits
Laboratory Control Sample					
Uranium –234	10	7	94	128	80-120
Uranium –238	10	8	97	128	80-120
Thorium -228	10	10	94	117	80-120
Thorium -230	10	10	94	118	80-120
Thorium -232	10	10	88	116	80-120
Cobalt - 60	10	10	99	102	80-120
Cesium – 137	10	10	100	105	80-120

Table F.4.3.6.2 Radiochemicals Lab Duplicate Precision Summary - Soil Samples

Analyte	Number QA/QC Pairs	Number within Limits	Maximum % RPD	Limits
Uranium –238	10	9	39	35
Uranium –238	10	8	58	35
Thorium- 232	10	6	83	35
Thorium- 232	10	9	37	35
Thorium- 232	10	8	50	35
Ac-228	2	2	28	35
K-40Cesium- 137	2	2	23	35
Bi-214	8	8	7.3	35
Pb-214	3	3	4.3	35
Th-234	2	2	13	35
Tl-208	2	2	3	35

Table F.5.3.1 Field Duplicate Organics Precision Summary - Soil Samples

Analyte	# of Pairs	# in Limits	Max % RPD	Limits
Vinyl Chloride	1	1	24	50
Carbon disulfide	2	0	67	50
1,1 Dichloroethene	1	0	104	50
Naphthalene	1	1	32	50
Aroclor 1254	1	1	50	50
Benzo(a)anthracene	1	1	15	50
Benzo(a)pyrene	1	1	12	50
Benzo(b)fluoranthene	1	1	2.1	50
Benzo(ghi)perylene	1	1	3.2	50
Benzo(k)fluoranthene	1	1	28	50
Chrysene	1	1	6.8	50
Fluoranthene	2	1	160	50
Indeno(1,2,3-c,d)pyrene	1	1	11	50
Phenanthrene	1	1	36	50
Pyrene	1	1	27	50

Table F.5.3.2 Field Duplicate Metals Precision – Soil Samples

Analyte	# of Pairs	# in Limits	Maximum % RPD	Limits
Aluminum	3	3	16	50
Antimony	3	3	49	
Arsenic	3	3	100	50
Barium	3	3	15	50
Beryllium	2	1	4.5	50
Cadmium	3	2	165	50
Calcium	3	2	110	50
Chromium	3	3	61	50
Cobalt	3	2	37	50
Copper	3	2	148	50
Iron	3	2	62	50
Lead	3	2	135	50
Magnesium	3	3	54	50
Manganese	3	3	15	50
Mercury	3	3	40	50
Nickel	3	3	36	50
Potassium	3	3	45	50
Selenium	1	1	2.8	50
Sodium	2	2	20	50
Vanadium	3	3	13	50
Zinc	3	2	78	50

Table F.5.3.3 Field Duplicate Radiochemical Precision – Soil

Analyte	# of Pairs	# in Limits	Maximum % RPD	Limits
Uranium 233/234	8	7	107	50
Uranium 235	3	1	133	50
Uranium 238	8	6	126	50
Thorium 228	8	8	50	50
Thorium 230	8	7	52	50
Thorium 232	8	8	42	50
Actinium 228	7	7	34	50
Cesium 137	3	3	40	50
Potassium 40	2	2	2.2	50
Radium 226	6	6	17	50
Thorium 234	4	4	37	50

APPENDIX G

Matrix Tables: Sample Analytical Results

Painesville FUSRAP Site RI/FS

Station	IAA-BH0010	IAA-BH0010	IAA-BH0010	IAA-BH0010	IAA-BH0013	IAA-BH0013	IAA-BH0013	IAA-BH0013	IAA-BH0013	IAA-BH0014
Sample No	**PNV0627**	**PNV0698**	**PNV0700**	**PNV0701**	**PNV0049**	**PNV0050**	**PNV0051**	**PNV0052**	**PNV0053**	**PNV0054**
Collection Date	**10/03/96**	**10/03/96**	**10/03/96**	**10/03/96**	**08/12/96**	**08/12/96**	**08/12/96**	**08/12/96**	**08/12/96**	**08/12/96**
Depth (ft)	**1.0-2.0**	**0.0-1.0**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**
Duplicate ID										
Northing	**232880**	**232880**	**232880**	**232880**	**232820**	**232820**	**232820**	**232820**	**232820**	**232800**
Easting	**704984**	**704984**	**704984**	**704984**	**704950**	**704950**	**704950**	**704950**	**704950**	**704940**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)	5.75									
Thorium-227 (pCi/g)	3.65				0.59	0.63	1.25 J	0.13 UJ	0.25 UJ	0.43
Thorium-228 (pCi/g)	0.91	1.61	0.84	1.31	0.97	1.09	1.4 J	1.23	1.61	1.32
Thorium-230 (pCi/g)	5.22	1.99	1.85	1.59	1.73	2.21	6.8 J	1.45	1.65	1.58
Thorium-232 (pCi/g)	0.89	0.95	1.11	0.9	1.16	1.09	1.29 J	1.33	1.4	1.33
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)	12.65									
Uranium-235 (pCi/g)	0.54 J									
Uranium-238 (pCi/g)	12.24									
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	2.9 UJ	0.54 U	0.6 U	0.63 U	0.56 U	0.54 U	0.59	0.54 U	0.57 U	0.57 U
Actinium-228 (pCi/g)										
Americium-241 (pCi/g)	0.63 UJ	0.22 U	0.25 U	0.25 U	0.23 U	0.24 U	0.4 U	0.23 U	0.23 U	0.24 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)										
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)		0.17	0.06 U	0.06 U	0.06 U	0.11	0.27	0.09	0.06 U	0.24
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)	6.2 UJ									
Lead-212 (pCi/g)	1.5									
Lead-214 (pCi/g)										
Neodymium-147 (pCi/g)	2.7									
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	12.6	12.11	18.03	25.53	24.89	18.16	19.47	24.55	28.71	25.04
Protactinium-231 (pCi/g)	11.1 UJ	1.6 U	1.79 U	1.83 U	1.74 U	1.74 U	2.6 U	1.66 U	1.7 U	1.78 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)	1.5									
Radium-226 (pCi/g)	5	1.28	1.18	1.04	1.24	2.48	9.05	1.16	1.18	1.37
Radium-228 (pCi/g)	1.5 UJ	1.13	1.17	1.31	1.05	0.94	0.96	1.09	1.24	1.22
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	1.5 UJ	1.13	1.17	1.31	1.05	0.94	0.96	1.09	1.24	1.22
Thorium-230 (pCi/g)		18.2 U	19.8 U	21.3 U	19.5 U	20.4 U	32.2 U	19 U	19 U	19.9 U
Thorium-232 (pCi/g)	1.5 UJ	1.13	1.17	1.31	1.05	0.94	0.96	1.09	1.24	1.22
Thorium-234 (pCi/g)	15.3									

Station	**IAA-BH0010**	**IAA-BH0010**	**IAA-BH0010**	**IAA-BH0010**	**IAA-BH0013**	**IAA-BH0013**	**IAA-BH0013**	**IAA-BH0013**	**IAA-BH0013**	**IAA-BH0014**
Sample No	**PNV0627**	**PNV0698**	**PNV0700**	**PNV0701**	**PNV0049**	**PNV0050**	**PNV0051**	**PNV0052**	**PNV0053**	**PNV0054**
Collection Date	**10/03/96**	**10/03/96**	**10/03/96**	**10/03/96**	**08/12/96**	**08/12/96**	**08/12/96**	**08/12/96**	**08/12/96**	**08/12/96**
Depth (ft)	**1.0-2.0**	**0.0-1.0**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**
Duplicate ID										
Northing	**232880**	**232880**	**232880**	**232880**	**232820**	**232820**	**232820**	**232820**	**232820**	**232800**
Easting	**704984**	**704984**	**704984**	**704984**	**704950**	**704950**	**704950**	**704950**	**704950**	**704940**
Uranium-235 (pCi/g)	1.3	0.24	0.21	0.11 U	0.19	0.35	1.15	0.28	0.2	0.24
Uranium-238 (pCi/g)	15.3	0.74 U	3.05 U	0.12 U	1.92 U	2.57 U	6.52 U	2.59 U	1.5 U	1.74 U

Station	IAA-BH0014	IAA-BH0014	IAA-BH0014	IAA-BH0014	IAA-BH0015	IAA-BH0015	IAA-BH0015	IAA-BH0015	IAA-BH0015	IAA-BH0016
Sample No	**PNV0055**	**PNV0057**	**PNV0058**	**PNV0059**	**PNV0062**	**PNV0063**	**PNV0064**	**PNV0065**	**PNV0066**	**PNV0068**
Collection Date	**08/12/96**	**08/12/96**	**08/12/96**	**08/12/96**	**08/13/96**	**08/13/96**	**08/13/96**	**08/13/96**	**08/13/96**	**08/13/96**
Depth (ft)	**0.5-1.5**	**2.5-3.5**	**3.5-4.5**	**1.5-2.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**
Duplicate ID										
Northing	**232800**	**232800**	**232800**	**232800**	**232800**	**232800**	**232800**	**232800**	**232800**	**232790**
Easting	**704940**	**704940**	**704940**	**704940**	**704960**	**704960**	**704960**	**704960**	**704960**	**704950**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)	0.14 UJ	0.1 UJ	0.34	0.23 UJ	0.56	0.12 UJ	0.18 UJ	0.27	0.41	
Thorium-228 (pCi/g)	1.56	1.37	1.62	1.35 J	1.2	1.27	1.45	1.05	1.34	1.38
Thorium-230 (pCi/g)	1.23	1.67	1.32	1.11 J	1.39	1.56	1.2	1.09	1.66	3.33
Thorium-232 (pCi/g)	0.88	1.09	0.96	1.14 J	0.99	1.03	1.33	1.09	1.37	1.34
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)				0.87						
Uranium-235 (pCi/g)				0.09 UJ						
Uranium-238 (pCi/g)				1.08						
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.59 U	0.5 U	0.57 U	1.52 UJ	0.57 U	0.52 U	0.58 U	0.57 U	0.57 U	0.21 U
Actinium-228 (pCi/g)										
Americium-241 (pCi/g)	0.23 U	0.21 U	0.24 U	0.26 UJ	0.24 U	0.23 U	0.23 U	0.23 U	0.23 U	0.28 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)				0.92						
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	0.06 U	0.05 U	0.06 U		0.01 U	0.09	0.06 U	0.06 U	0.06 U	0.25
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)										
Lead-212 (pCi/g)				0.9						
Lead-214 (pCi/g)				0.92						
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	26.4	24.79	26.54	23	23.34	17.54	26.5	28.99	28.22	18.55
Protactinium-231 (pCi/g)	1.72 U	1.49 U	1.68 U	5.43 UJ	1.71 U	1.65 U	1.71 U	1.66 U	1.71 U	1.92 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)				0.88						
Radium-226 (pCi/g)	1.04	0.92	0.99	0.92	1.41	1.68	1.07	1.13	0.95	3.39
Radium-228 (pCi/g)	1.18	0.93	1.18	0.78 UJ	1.06	0.98	1.2	1.26	1.18	1.02
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	1.18	0.93	1.18	0.78 UJ	1.06	0.98	1.2	1.26	1.18	1.02
Thorium-230 (pCi/g)	19.6 U	16.7 U	19.7 U		19.6 U	19.2 U	19.1 U	19.4 U	18.5 U	22.7 U
Thorium-232 (pCi/g)	1.18	0.93	1.18	0.78 UJ	1.06	0.98	1.2	1.26	1.18	1.02
Thorium-234 (pCi/g)										

Station	IAA-BH0014	IAA-BH0014	IAA-BH0014	IAA-BH0014	IAA-BH0015	IAA-BH0015	IAA-BH0015	IAA-BH0015	IAA-BH0015	IAA-BH0016
Sample No	PNV0055	PNV0057	PNV0058	PNV0059	PNV0062	PNV0063	PNV0064	PNV0065	PNV0066	PNV0068
Collection Date	08/12/96	08/12/96	08/12/96	08/12/96	08/13/96	08/13/96	08/13/96	08/13/96	08/13/96	08/13/96
Depth (ft)	0.5-1.5	2.5-3.5	3.5-4.5	1.5-2.5	0.0-0.5	0.5-1.5	1.5-2.5	2.5-3.5	3.5-4.5	0.0-0.5
Duplicate ID										
Northing	232800	232800	232800	232800	232800	232800	232800	232800	232800	232790
Easting	704940	704940	704940	704940	704960	704960	704960	704960	704960	704950
Uranium-235 (pCi/g)	0.15	0.23	0.14	0.22 UJ	0.25	0.24	0.11	0.16	0.17	0.4
Uranium-238 (pCi/g)	2.3 U	1.18 U	-0.13 U	2.8 UJ	2.22 U	2.56 U	1.54 U	-0.09 U	1.79 U	2.36 U

Station	**IAA-BH0016**	**IAA-BH0016**	**IAA-BH0016**	**IAA-BH0016**	**IAA-BH0017**	**IAA-BH0017**	**IAA-BH0017**	**IAA-BH0017**	**IAA-BH0017**	**IAA-BH0018**
Sample No	**PNV0069**	**PNV0071**	**PNV0072**	**PNV0073**	**PNV0067**	**PNV0074**	**PNV0076**	**PNV0077**	**PNV0078**	**PNV0081**
Collection Date	**08/13/96**	**08/13/96**	**08/13/96**	**08/13/96**	**08/13/96**	**08/13/96**	**08/13/96**	**08/13/96**	**08/13/96**	**08/14/96**
Depth (ft)	**0.5-1.5**	**3.5-4.5**	**2.5-3.5**	**1.5-2.5**	**0.5-1.5**	**0.0-0.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**
Duplicate ID										
Northing	**232790**	**232790**	**232790**	**232790**	**232790**	**232790**	**232790**	**232790**	**232790**	**232780**
Easting	**704950**	**704950**	**704950**	**704950**	**704960**	**704960**	**704960**	**704960**	**704960**	**704930**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)				0.37 J	0.06 UJ					
Thorium-228 (pCi/g)	0.94	1.73	1.48	1.2 J	1.29		1.92	1.28	1.64	0.75
Thorium-230 (pCi/g)	1.31	2.36	2.03	1.65 J	1.1		1.61	1.58	2.27	2.43
Thorium-232 (pCi/g)	1.08	1.14	1.53	1.25 J	1.1		1.23	1.56	1.52	1.21
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)				1.4	1.37					
Uranium-235 (pCi/g)				0.06 UJ	0.11 J					
Uranium-238 (pCi/g)				1.47	1.37					
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.46 U	0.55 U	0.6 U	1.3 UJ	1.5 UJ	0.35	0.51 U	0.55 U	0.59 U	0.67 U
Actinium-228 (pCi/g)				1.3	0.83					
Americium-241 (pCi/g)	0.2 U	0.22 U	0.24 U	0.31 UJ	0.26 UJ	0.32 U	0.22 U	0.23 U	0.23 U	0.29 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)				1.1	0.77					
Cadmium-109 (pCi/g)					0.55 UJ					
Cesium-137 (pCi/g)	0.05 U	0.05 U	0.06 U			0.26	0.05 U	0.06 U	0.06 U	0.22
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)										
Lead-212 (pCi/g)				1.1 J	0.28 J					
Lead-214 (pCi/g)				1.1	0.77					
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	16.99	28.35	30.11	20.1	15.6	16.14	25.25	27.95	28.04	17.99
Protactinium-231 (pCi/g)	1.35 U	1.58 U	1.75 U	3.8 UJ	5.4 UJ	2.18 U	1.53 U	1.66 U	1.74 U	2.08 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)				1	0.48					
Radium-226 (pCi/g)	0.91	1.11	1.32	1.1	0.77	6.64	1.12	1.25	1.34	1.79
Radium-228 (pCi/g)	0.92	1.22	1.28	1.3	0.83	0.89	1.1	1.23	1.19	1.02
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	0.92	1.22	1.28	1.3	0.83	0.89	1.1	1.23	1.19	1.02
Thorium-230 (pCi/g)	15.7 U	17.9 U	20.3 U			26.3 U	17.4 U	18.5 U	19 U	23.6 U
Thorium-232 (pCi/g)	0.92	1.22	1.28	1.3	0.83	0.89	1.1	1.23	1.19	1.02
Thorium-234 (pCi/g)										

Station	IAA-BH0016	IAA-BH0016	IAA-BH0016	IAA-BH0016	IAA-BH0017	IAA-BH0017	IAA-BH0017	IAA-BH0017	IAA-BH0017	IAA-BH0018
Sample No	PNV0069	PNV0071	PNV0072	PNV0073	PNV0067	PNV0074	PNV0076	PNV0077	PNV0078	PNV0081
Collection Date	08/13/96	08/13/96	08/13/96	08/13/96	08/13/96	08/13/96	08/13/96	08/13/96	08/13/96	08/14/96
Depth (ft)	0.5-1.5	3.5-4.5	2.5-3.5	1.5-2.5	0.5-1.5	0.0-0.5	1.5-2.5	2.5-3.5	3.5-4.5	0.0-0.5
Duplicate ID										
Northing	232790	232790	232790	232790	232790	232790	232790	232790	232790	232780
Easting	704950	704950	704950	704950	704960	704960	704960	704960	704960	704930
Uranium-235 (pCi/g)	0.13	0.17	0.16	0.19 UJ	0.18 UJ	0.66	0.19	0.23	0.19	0.27
Uranium-238 (pCi/g)	0.89 U	2.27 U	1.44 U	3 UJ	2.5 UJ	2.57 U	3.16 U	1.56 U	4.2	3.92 U

Station	**IAA-BH0018**	**IAA-BH0018**	**IAA-BH0018**	**IAA-BH0018**	**IAA-BH0019**	**IAA-BH0019**	**IAA-BH0019**	**IAA-BH0019**	**IAA-BH0019**	**IAA-BH0028**
Sample No	**PNV0083**	**PNV0084**	**PNV0085**	**PNV0086**	**PNV0087**	**PNV0088**	**PNV0089**	**PNV0091**	**PNV0092**	**PNV0158**
Collection Date	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/21/96**
Depth (ft)	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.5-1.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**3.5-4.5**	**2.5-3.5**	**0.0-0.5**
Duplicate ID										
Northing	**232780**	**232780**	**232780**	**232780**	**232780**	**232780**	**232780**	**232780**	**232780**	**232910**
Easting	**704930**	**704930**	**704930**	**704930**	**704940**	**704940**	**704940**	**704940**	**704940**	**704998**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)				0.09 UJ					0.15	
Thorium-228 (pCi/g)	1.75	1.32	1.18	1.47	1.19	1.65	2.75	1.88	1.37	1.4
Thorium-230 (pCi/g)	1.91	1.64	1.57	1.75	1.96	3.04	2.56	2.49	1.7	4.2
Thorium-232 (pCi/g)	1.26	1.21	1.39	1.37	1.22	1.73	1.53	1.15	1.58	1.32
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)				1.75					1.6	
Uranium-235 (pCi/g)				0.05 UJ					0.07 UJ	
Uranium-238 (pCi/g)				1.6					1.61	
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.57 U	0.6 U	0.56 U	1.8 UJ	0.14 U	0.24 U	0.18 U	0.37	1.3 UJ	0.33 U
Actinium-228 (pCi/g)				1.1					1.2	
Americium-241 (pCi/g)	0.23 U	0.23 U	0.23 U	0.3 UJ	0.06 U	0.06 U	0.02 U	0.05 U	0.34 UJ	0.32 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)				1.3					1.1	
Cadmium-109 (pCi/g)				2.1 UJ						
Cesium-137 (pCi/g)	0.06 U	0.06 U	0.06 U	0.28 UJ	0.44	0.03 U	0.02 U	0.04 U		0.25
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)				0.35 UJ						
Lead-212 (pCi/g)				1.4					1.3	
Lead-214 (pCi/g)				1.3					1.1	
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	24.47	26.57	25.76	18.1	15.73	20.89	29.73	26.72	23.5	6.15
Protactinium-231 (pCi/g)	1.68 U	1.75 U	1.63 U	6.4 UJ	0.61 U	-0.44 U	-0.38 U	0.67 U	4.9 UJ	2.28 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)				1.3					1.3	
Radium-226 (pCi/g)	1.2	1.26	1.07	1.3	2.6	1.36	1.37	1.3	1.1	4.71
Radium-228 (pCi/g)	1.22	1.19	1.11	1.1	1.06	1.29	1.43	1.33	1.2	0.86
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	1.22	1.19	1.11	1.1	1.06	1.29	1.43	1.33	1.2	0.86
Thorium-230 (pCi/g)	18.7 U	19.7 U	8.38 U		-1.01 U	3.22 U	0.61 U	9.28 U		26.8 U
Thorium-232 (pCi/g)	1.22	1.19	1.11	1.1	1.06	1.29	1.43	1.33	1.2	0.86
Thorium-234 (pCi/g)										

Station	IAA-BH0018	IAA-BH0018	IAA-BH0018	IAA-BH0018	IAA-BH0019	IAA-BH0019	IAA-BH0019	IAA-BH0019	IAA-BH0019	IAA-BH0028
Sample No	**PNV0083**	**PNV0084**	**PNV0085**	**PNV0086**	**PNV0087**	**PNV0088**	**PNV0089**	**PNV0091**	**PNV0092**	**PNV0158**
Collection Date	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/14/96**	**08/21/96**
Depth (ft)	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.5-1.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**3.5-4.5**	**2.5-3.5**	**0.0-0.5**
Duplicate ID										
Northing	**232780**	**232780**	**232780**	**232780**	**232780**	**232780**	**232780**	**232780**	**232780**	**232910**
Easting	**704930**	**704930**	**704930**	**704930**	**704940**	**704940**	**704940**	**704940**	**704940**	**704998**
Uranium-235 (pCi/g)	0.22	0.2	0.13	0.22 UJ	0.28	0.05 U	0.16 U	0.06 U	0.2 UJ	0.69
Uranium-238 (pCi/g)	1.4 U	1.39 U	1.2 U	3.1 UJ	2.33	2.51	1.83	1.56	3.1 UJ	3.83 U

Station	**IAA-BH0028**	**IAA-BH0029**	**IAA-BH0029**	**IAA-BH0029**	**IAA-BH0029**	**IAA-BH0030**	**IAA-BH0030**	**IAA-BH0030**	**IAA-BH0030**	**IAA-BH0030**
Sample No	**PNV0159**	**PNV0164**	**PNV0165**	**PNV0166**	**PNV0167**	**PNV0168**	**PNV0169**	**PNV0170**	**PNV0171**	**PNV0172**
Collection Date	**08/21/96**	**08/22/96**	**08/22/96**	**08/22/96**	**08/22/96**	**08/22/96**	**08/22/96**	**08/22/96**	**08/22/96**	**08/22/96**
Depth (ft)	**0.5-1.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**
Duplicate ID										
Northing	**232910**	**232899**	**232899**	**232899**	**232899**	**232890**	**232890**	**232890**	**232890**	**232890**
Easting	**704998**	**704999**	**704999**	**704999**	**704999**	**704970**	**704970**	**704970**	**704970**	**704970**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)										
Thorium-228 (pCi/g)	1.38	1.27	1.25	0.62	1.33	1.41	1.15	1.1	1.42	1.14
Thorium-230 (pCi/g)	1.97	4.4	1.43	0.65	1.7	3.31	3.91	2.13	1.52	1.81
Thorium-232 (pCi/g)	1.12	1.42	1.24	0.55	1.17	0.82	1.03	0.74	1.06	0.84
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)										
Uranium-235 (pCi/g)										
Uranium-238 (pCi/g)										
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.53 U	0.18 U	0.56 U	0.56 U	0.57 U	0.61 U	0.58 U	0.58 U	0.59 U	0.64 U
Actinium-228 (pCi/g)										
Americium-241 (pCi/g)	0.23 U	0.27 U	0.22 U	0.23 U	0.23 U	0.29 U	0.28 U	0.26 U	0.26 U	0.26 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)										
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	0.02 U	0.06 U	0.06 U	0.06 U	0.06 U	0.11	0.15	0.04 U	0.07 U	0.07 U
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)										
Lead-212 (pCi/g)										
Lead-214 (pCi/g)										
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	12.75	12.58	20.86	22.14	26.13	22.02	18.34	20	21.17	20.6
Protactinium-231 (pCi/g)	1.64 U	1.96 U	1.64 U	1.73 U	1.67 U	2.05 U	1.95 U	1.84 U	1.81 U	1.96 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)										
Radium-226 (pCi/g)	1.58	3.27	1.25	0.99	0.99	3.03	3.77	1.53	1.12	1.47
Radium-228 (pCi/g)	1.12	1.08	1.01	1.08	1.22	1.02	0.99	1	1.13	1.03
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	1.12	1.08	1.01	1.08	1.22	1.02	0.99	1	1.13	1.03
Thorium-230 (pCi/g)	18.1 U	23.2 U	18.8 U	19 U	19 U	24.5 U	23.8 U	20.7 U	20.5 U	22.3 U
Thorium-232 (pCi/g)	1.12	1.08	1.01	1.08	1.22	1.02	0.99	1	1.13	1.03
Thorium-234 (pCi/g)										

Station	IAA-BH0028	IAA-BH0029	IAA-BH0029	IAA-BH0029	IAA-BH0029	IAA-BH0030	IAA-BH0030	IAA-BH0030	IAA-BH0030	IAA-BH0030
Sample No	PNV0159	PNV0164	PNV0165	PNV0166	PNV0167	PNV0168	PNV0169	PNV0170	PNV0171	PNV0172
Collection Date	08/21/96	08/22/96	08/22/96	08/22/96	08/22/96	08/22/96	08/22/96	08/22/96	08/22/96	08/22/96
Depth (ft)	0.5-1.5	0.5-1.5	1.5-2.5	2.5-3.5	3.5-4.5	0.0-0.5	0.5-1.5	1.5-2.5	2.5-3.5	3.5-4.5
Duplicate ID										
Northing	232910	232899	232899	232899	232899	232890	232890	232890	232890	232890
Easting	704998	704999	704999	704999	704999	704970	704970	704970	704970	704970
Uranium-235 (pCi/g)	0.31	0.49	0.25	0.17	0.18	0.51	0.56	0.36	0.21	0.27
Uranium-238 (pCi/g)	2.27 U	3.99 U	1.72 U	1.34 U	0.4 U	4.3 U	4.07 U	3.96 U	4.44	2.14 U

Station	**IAA-BH0031**	**IAA-BH0033**	**IAA-BH0033**	**IAA-BH0034**	**IAA-BH0035**	**IAA-BH0036**	**IAA-BH0037**	**IAA-BH0038**	**IAA-BH0038**	**IAA-BH0038**
Sample No	**PNV0174**	**PNV0186**	**PNV0187**	**PNV0189**	**PNV0195**	**PNV0200**	**PNV0206**	**PNV0208**	**PNV0209**	**PNV0210**
Collection Date	**08/22/96**	**08/26/96**	**08/26/96**	**08/29/96**	**08/27/96**	**08/26/96**	**08/29/96**	**08/29/96**	**08/29/96**	**08/29/96**
Depth (ft)	**0.5-1.5**	**2.5-3.5**	**3.5-4.5**	**0.5-1.5**	**1.5-2.5**	**1.5-2.5**	**2.5-3.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**
Duplicate ID										
Northing	**232870**	**232860**	**232860**	**232860**	**232850**	**232850**	**232850**	**232840**	**232840**	**232840**
Easting	**704970**	**705000**	**705000**	**705020**	**704980**	**705000**	**705014**	**705014**	**705014**	**705014**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)										
Thorium-228 (pCi/g)	0.98	1.21	1.45		1.47	1.53		0.82		1.49
Thorium-230 (pCi/g)	1.46	2.04	1.86		1.72	2.71		1.54		2.03
Thorium-232 (pCi/g)	1.1	1.13	1.38		1.01	1.19		0.53		1.47
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)										
Uranium-235 (pCi/g)										
Uranium-238 (pCi/g)										
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.55 U	0.62 U	0.59 U	0.21 U	0.54 U	0.58 U	0.19 U	0.06 U	0.11 U	0.05 U
Actinium-228 (pCi/g)										
Americium-241 (pCi/g)	0.22 U	0.29 U	0.25 U	-0.04 U	0.23 U	0.24 U	0.05 U	0.03 U	0.11 U	0.09 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)										
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	0.06 U	0.07 U	0.06 U	0.06	0.01 U	0.06 U	0.03 U	0.02 U	-0.01 U	-0.01 U
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)										
Lead-212 (pCi/g)										
Lead-214 (pCi/g)										
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	24.44	24.39	26.01	19.71	19.57	21.46	24.7	10.57	28.01	24.59
Protactinium-231 (pCi/g)	1.66 U	2 U	1.83 U	-0.27 U	1.65 U	1.74 U	-0.42 U	0.18 U	0.13 U	0.3 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)										
Radium-226 (pCi/g)	0.99	3.58	1.56	1.17	1.36	1.56	1.12	0.7	1.18	1.09
Radium-228 (pCi/g)	1.13	1.25	1.22	1.07	1.06	1.1	1.29	0.36	1.21	1.34
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	1.13	1.25	1.22	1.07	1.06	1.1	1.29	0.36	1.21	1.34
Thorium-230 (pCi/g)	18.3 U	23.9 U	3.1 U	-3.25 U	18.7 U	19.6 U	-5.89 U	-3.91 U	1.82 U	15.43
Thorium-232 (pCi/g)	1.13	1.25	1.22	1.07	1.06	1.1	1.29	0.36	1.21	1.34
Thorium-234 (pCi/g)										

Station	IAA-BH0031	IAA-BH0033	IAA-BH0033	IAA-BH0034	IAA-BH0035	IAA-BH0036	IAA-BH0037	IAA-BH0038	IAA-BH0038	IAA-BH0038
Sample No	PNV0174	PNV0186	PNV0187	PNV0189	PNV0195	PNV0200	PNV0206	PNV0208	PNV0209	PNV0210
Collection Date	08/22/96	08/26/96	08/26/96	08/29/96	08/27/96	08/26/96	08/29/96	08/29/96	08/29/96	08/29/96
Depth (ft)	0.5-1.5	2.5-3.5	3.5-4.5	0.5-1.5	1.5-2.5	1.5-2.5	2.5-3.5	0.0-0.5	0.5-1.5	1.5-2.5
Duplicate ID										
Northing	232870	232860	232860	232860	232850	232850	232850	232840	232840	232840
Easting	704970	705000	705000	705020	704980	705000	705014	705014	705014	705014
Uranium-235 (pCi/g)	0.14	0.43	0.19	0.2 U	0.23	0.19	0.17 U	0.11 U	0.06 U	0.11 U
Uranium-238 (pCi/g)	1.57 U	0.43 U	0.85 U	1.71	1.65 U	3.06 U	1.71	0.86	1.67	1.36

Station	IAA-BH0038	IAA-BH0038	IAA-BH0039	IAA-BH0039	IAA-BH0039	IAA-BH0039	IAA-BH0039	IAA-BH0041	IAA-BH0041	IAA-BH0041
Sample No	**PNV0211**	**PNV0212**	**PNV0213**	**PNV0214**	**PNV0215**	**PNV0216**	**PNV0217**	**PNV0223**	**PNV0224**	**PNV0225**
Collection Date	**08/29/96**	**08/29/96**	**08/27/96**	**08/27/96**	**08/27/96**	**08/27/96**	**08/27/96**	**08/28/96**	**08/28/96**	**08/28/96**
Depth (ft)	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**
Duplicate ID										
Northing	**232840**	**232840**	**232830**	**232830**	**232830**	**232830**	**232830**	**232830**	**232830**	**232830**
Easting	**705014**	**705014**	**704990**	**704990**	**704990**	**704990**	**704990**	**705015**	**705015**	**705015**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)										
Thorium-228 (pCi/g)					1.32	1.46	1.55	0.25 U		
Thorium-230 (pCi/g)					1.99	1.67	1.55	2.25		
Thorium-232 (pCi/g)					0.85	0.93	1.44	0.14 U		
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)										
Uranium-235 (pCi/g)										
Uranium-238 (pCi/g)										
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.08 U	0.13 U	3.37	5.08	0.58 U	0.59 U	0.67 U	0.07 U	0.05 U	0.03 U
Actinium-228 (pCi/g)										
Americium-241 (pCi/g)	0.04 U	0.01 U	1.25 U	1.51 U	0.28 U	0.24 U	0.27 U	-0.01 U	0.06 U	0.02 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)										
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	-0.01 U	0.04 U	0.23	0.3 U	0.07 U	0.06 U	0.06 U	-0.01 U	0.01 U	-0.01 U
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)										
Lead-212 (pCi/g)										
Lead-214 (pCi/g)										
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	24.27	24.71	16.68	7.2	18.17	22.22	26.64	9.93	23.02	25.78
Protactinium-231 (pCi/g)	1.06	0.65 U	8.14 U	1.24 U	2.03 U	1.81 U	2.02 U	0.24 U	0.23 U	1.15 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)										
Radium-226 (pCi/g)	1.02	1.05	50.54	66.27	3.02	1.44	1.39	1.37	1.08	1.02
Radium-228 (pCi/g)	1.33	1.21	0.84	0.83 U	0.92	1.1	1.35	0.35	1.01	1.25
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	1.33	1.21	0.84	0.83 U	0.92	1.1	1.35	0.35	1.01	1.25
Thorium-230 (pCi/g)	1.18 U	-0.01 U	106 U	32.12 U	23.1 U	19.5 U	22.7 U	2.55 U	5.97	0.67 U
Thorium-232 (pCi/g)	1.33	1.21	0.84	0.83 U	0.92	1.1	1.35	0.35	1.01	1.25
Thorium-234 (pCi/g)										

Station	**IAA-BH0038**	**IAA-BH0038**	**IAA-BH0039**	**IAA-BH0039**	**IAA-BH0039**	**IAA-BH0039**	**IAA-BH0039**	**IAA-BH0041**	**IAA-BH0041**	**IAA-BH0041**
Sample No	**PNV0211**	**PNV0212**	**PNV0213**	**PNV0214**	**PNV0215**	**PNV0216**	**PNV0217**	**PNV0223**	**PNV0224**	**PNV0225**
Collection Date	**08/29/96**	**08/29/96**	**08/27/96**	**08/27/96**	**08/27/96**	**08/27/96**	**08/27/96**	**08/28/96**	**08/28/96**	**08/28/96**
Depth (ft)	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**
Duplicate ID										
Northing	**232840**	**232840**	**232830**	**232830**	**232830**	**232830**	**232830**	**232830**	**232830**	**232830**
Easting	**705014**	**705014**	**704990**	**704990**	**704990**	**704990**	**704990**	**705015**	**705015**	**705015**
Uranium-235 (pCi/g)	0.15 U	0.01 U	5.3	6.4	0.34	0.22	0.36	0.04 U	0.18 U	-0.03 U
Uranium-238 (pCi/g)	1.42	1.47	23.39	52.93	4.73	1.31 U	3.26 U	0.65	1.22	1.21

Station	IAA-BH0041	IAA-BH0041	IAA-BH0042	IAA-BH0042	IAA-BH0042	IAA-BH0043	IAA-BH0043	IAA-BH0043	IAA-BH0043	IAA-BH0043
Sample No	**PNV0226**	**PNV0227**	**PNV0230**	**PNV0231**	**PNV0232**	**PNV0233**	**PNV0235**	**PNV0236**	**PNV0237**	**PNV0289**
Collection Date	**08/28/96**	**08/28/96**	**08/27/96**	**08/27/96**	**08/27/96**	**08/28/96**	**08/28/96**	**08/28/96**	**08/28/96**	**08/28/96**
Depth (ft)	**2.5-3.5**	**3.5-4.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.5-1.5**
Duplicate ID										
Northing	**232830**	**232830**	**232820**	**232820**	**232820**	**232820**	**232820**	**232820**	**232820**	**232820**
Easting	**705015**	**705015**	**704990**	**704990**	**704990**	**705004**	**705004**	**705004**	**705004**	**705004**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)										0.67
Thorium-228 (pCi/g)			1.64	1.61	1.46	0.18				2.93
Thorium-230 (pCi/g)			2.01	3.23	1.6	7.86				49
Thorium-232 (pCi/g)			1.05	1.39	0.99	0.36				1.13
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)										62.46 J
Uranium-235 (pCi/g)										3.06 J
Uranium-238 (pCi/g)										63.69 J
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.14 U	0.13 U	0.58 U	0.62 U	0.6 U	0.48	0.2 U	0.18 U	0.31	3.1
Actinium-228 (pCi/g)										
Americium-241 (pCi/g)	0.06 U	-0.01 U	0.32 U	0.35 U	0.39 U	0.03 U	-0.01 U	0.06 U	-0.01 U	0.84 UJ
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)										49.4
Cadmium-109 (pCi/g)										41.09
Cesium-137 (pCi/g)	0.01 U	0.01 U	0.07 U	0.07 U	0.06 U	0.05	-0.02 U	0.02 U	-0.02 U	
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)										44
Lead-212 (pCi/g)										0.71
Lead-214 (pCi/g)										49.4
Neodymium-147 (pCi/g)										2.1
Niobium-95 (pCi/g)										1 UJ
Potassium-40 (pCi/g)	24.74	23.46	16.17	22.43	20.4	5.78	20.8	25.57	25.99	8.1
Protactinium-231 (pCi/g)	0.87 U	0.64 U	1.99 U	2.28 U	2.06 U	0.92 U	0.56 U	0.45 U	0.11 U	
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)										0.7 J
Radium-226 (pCi/g)	1	1.05	4.07	5.55	3.13	5.03	2.05	1.28	1.3	49.4
Radium-228 (pCi/g)	1.17	1.24	0.96	1.21	1.19	0.23	1.26	1.27	1.38	1.3 UJ
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	1.17	1.24	0.96	1.21	1.19	0.23	1.26	1.27	1.38	1.3 UJ
Thorium-230 (pCi/g)	2.74 U	1.35 U	25.4 U	27.5 U	30.6 U	4.13 U	1.39 U	2.19 U	2.38 U	
Thorium-232 (pCi/g)	1.17	1.24	0.96	1.21	1.19	0.23	1.26	1.27	1.38	1.3 UJ
Thorium-234 (pCi/g)										15

Station	IAA-BH0041	IAA-BH0041	IAA-BH0042	IAA-BH0042	IAA-BH0042	IAA-BH0043	IAA-BH0043	IAA-BH0043	IAA-BH0043	IAA-BH0043
Sample No	PNV0226	PNV0227	PNV0230	PNV0231	PNV0232	PNV0233	PNV0235	PNV0236	PNV0237	PNV0289
Collection Date	08/28/96	08/28/96	08/27/96	08/27/96	08/27/96	08/28/96	08/28/96	08/28/96	08/28/96	08/28/96
Depth (ft)	2.5-3.5	3.5-4.5	1.5-2.5	2.5-3.5	3.5-4.5	0.0-0.5	1.5-2.5	2.5-3.5	3.5-4.5	0.5-1.5
Duplicate ID										
Northing	232830	232830	232820	232820	232820	232820	232820	232820	232820	232820
Easting	705015	705015	704990	704990	704990	705004	705004	705004	705004	705004
Uranium-235 (pCi/g)	0.18 U	-0.05 U	0.98	1.1	2.37	0.62	0.32	0.14 U	0.05 U	5.4
Uranium-238 (pCi/g)	1.45	1.37	12.47	13.65	44.25	3.98	2.03	1.23	1.34	15

Station	**IAA-BH0044**	**IAA-BH0044**	**IAA-BH0044**	**IAA-BH0044**	**IAA-BH0044**	**IAA-BH0045**	**IAA-BH0085**	**IAA-BH0086**	**IAA-BH0087**	**IAA-BH0098**
Sample No	**PNV0238**	**PNV0239**	**PNV0240**	**PNV0241**	**PNV0242**	**PNV0246**	**PNV0460**	**PNV0467**	**PNV0470**	**PNV0534**
Collection Date	**08/28/96**	**08/28/96**	**08/28/96**	**08/28/96**	**08/28/96**	**08/28/96**	**09/18/96**	**09/18/96**	**09/18/96**	**09/24/96**
Depth (ft)	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**2.5-3.5**	**0.5-1.5**	**2.5-3.5**	**0.5-1.5**	**0.5-1.5**
Duplicate ID										
Northing	**232800**	**232800**	**232800**	**232800**	**232800**	**232800**	**232780**	**232810**	**232920**	**232770**
Easting	**704988**	**704988**	**704988**	**704988**	**704988**	**705000**	**704960**	**705020**	**705000**	**704940**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)										
Thorium-228 (pCi/g)							1.37	1.48	1.02	1.94
Thorium-230 (pCi/g)							3.94	2.25	1.69	1.86
Thorium-232 (pCi/g)							1.65	1.72	0.79	1.24
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)										
Uranium-235 (pCi/g)										
Uranium-238 (pCi/g)										
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	-0.02 U	0.14 U	0.12 U	0.16 U	0.21 U	0.18 U	0.52 U	0.57 U	0.56 U	0.55 U
Actinium-228 (pCi/g)										
Americium-241 (pCi/g)	0.01 U	0.01 U	0.05 U	0.02 U	0.05 U	0.06 U	0.21 U	0.22 U	0.24 U	0.22 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)										
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	0.01 U	0.03 U	0.01 U	0.03 U	-0.02 U	-0.03 U	0.06 U	0.06 U	0.09	0.06 U
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)										
Lead-212 (pCi/g)										
Lead-214 (pCi/g)										
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	4.66	6.03	10.71	13.19	13.26	20.26	21.14	23.6	5.62	26.86
Protactinium-231 (pCi/g)	-0.04 U	-0.22 U	1.2	-0.03 U	0.97 U	0.61 U	1.54 U	1.67 U	1.67 U	1.67 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)										
Radium-226 (pCi/g)	0.67	2.52	1.18	1.43	1.08	0.97	1.02	1.09	1.39	1.22
Radium-228 (pCi/g)	0.13	0.4	0.74	0.61	0.8	1.21	1.11	1.24	0.87	1.28
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	0.13	0.4	0.74	0.61	0.8	1.21	1.11	1.24	0.87	1.28
Thorium-230 (pCi/g)	2.38 U	-0.69 U	-0.24 U	6.72	-0.89 U	2.31 U	17.7 U	18.4 U	19.8 U	18.6 U
Thorium-232 (pCi/g)	0.13	0.4	0.74	0.61	0.8	1.21	1.11	1.24	0.87	1.28
Thorium-234 (pCi/g)										

Station	IAA-BH0044	IAA-BH0044	IAA-BH0044	IAA-BH0044	IAA-BH0044	IAA-BH0045	IAA-BH0085	IAA-BH0086	IAA-BH0087	IAA-BH0098
Sample No	**PNV0238**	**PNV0239**	**PNV0240**	**PNV0241**	**PNV0242**	**PNV0246**	**PNV0460**	**PNV0467**	**PNV0470**	**PNV0534**
Collection Date	**08/28/96**	**08/28/96**	**08/28/96**	**08/28/96**	**08/28/96**	**08/28/96**	**09/18/96**	**09/18/96**	**09/18/96**	**09/24/96**
Depth (ft)	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**2.5-3.5**	**0.5-1.5**	**2.5-3.5**	**0.5-1.5**	**0.5-1.5**
Duplicate ID										
Northing	**232800**	**232800**	**232800**	**232800**	**232800**	**232800**	**232780**	**232810**	**232920**	**232770**
Easting	**704988**	**704988**	**704988**	**704988**	**704988**	**705000**	**704960**	**705020**	**705000**	**704940**
Uranium-235 (pCi/g)	0.04 U	0.43	0.21	0.07 U	0.2	0.05 U	0.16	0.15	0.34	0.15
Uranium-238 (pCi/g)	0.72	4.16	2.81	2.18	1.61	1.67	0.51 U	2.37 U	2.78 U	2.93 U

Station	**IAA-BH0104**	**IAA-BH0104**	**IAA-BH0104**	**IAA-BH0104**	**IAA-BH0104**	**IAA-BH0104**	**IAA-BH0104**	**IAA-BH0104**	**IAA-BH0104**	**IAA-BH0104**
Sample No	**PNV0717**	**PNV0718**	**PNV0719**	**PNV0720**	**PNV0722**	**PNV0723**	**PNV0724**	**PNV0725**	**PNV0726**	**PNV0727**
Collection Date	**10/09/96**	**10/09/96**	**10/09/96**	**10/09/96**	**10/09/96**	**10/09/96**	**10/09/96**	**10/09/96**	**10/09/96**	**10/09/96**
Depth (ft)	**1.5-2.5**	**12.5-13.5**	**2.5-3.5**	**3.5-4.5**	**11.5-12.5**	**5.5-6.5**	**6.5-7.5**	**7.5-8.5**	**9.5-10.5**	**8.5-9.5**
Duplicate ID										
Northing	**232818**	**232818**	**232818**	**232818**	**232818**	**232818**	**232818**	**232818**	**232818**	**232818**
Easting	**704991**	**704991**	**704991**	**704991**	**704991**	**704991**	**704991**	**704991**	**704991**	**704991**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)										
Thorium-228 (pCi/g)	1.5	1.53	1.73	1.5	1.47	1.64	1.69	1.44	1.5	1.32
Thorium-230 (pCi/g)	1.84	1.71	1.18	1.22	2.07	1.75	2.18	1.92	2.05	1.39
Thorium-232 (pCi/g)	1.12	1.53	1.2	1.47	1.72	1.73	1.77	1.04	1.46	1.13
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)										
Uranium-235 (pCi/g)										
Uranium-238 (pCi/g)										
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.5 U	0.57 U	0.61 U	0.68 U	0.5 U	0.62 U	0.6 U	0.59 U	0.54 U	0.56 U
Actinium-228 (pCi/g)										
Americium-241 (pCi/g)	0.21 U	0.22 U	0.24 U	0.27 U	0.2 U	0.25 U	0.24 U	0.24 U	0.21 U	0.23 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)										
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	0.05 U	0.06 U	0.06 U	0.07 U	0.05 U	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)										
Lead-212 (pCi/g)										
Lead-214 (pCi/g)										
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	15.32	23.19	18.42	26.67	22.6	24.4	24.61	23.77	22.55	22.53
Protactinium-231 (pCi/g)	1.5 U	1.67 U	1.79 U	1.99 U	1.54 U	1.77 U	1.69 U	1.79 U	1.61 U	1.65 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)										
Radium-226 (pCi/g)	0.74	1	0.82	0.95	0.94	1	0.93	0.9	0.92	1
Radium-228 (pCi/g)	0.81	1.1	1.14	1.44	1.15	1.21	1.17	1.13	1.12	1.22
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	0.81	1.1	1.14	1.44	1.15	1.21	1.17	1.13	1.12	1.22
Thorium-230 (pCi/g)	16.6 U	18.5 U	19.6 U	21.5 U	17.1 U	20.7 U	19.5 U	19.1 U	18.1 U	19 U
Thorium-232 (pCi/g)	0.81	1.1	1.14	1.44	1.15	1.21	1.17	1.13	1.12	1.22
Thorium-234 (pCi/g)										

Station	IAA-BH0104	IAA-BH0104	IAA-BH0104	IAA-BH0104	IAA-BH0104	IAA-BH0104	IAA-BH0104	IAA-BH0104	IAA-BH0104	IAA-BH0104
Sample No	PNV0717	PNV0718	PNV0719	PNV0720	PNV0722	PNV0723	PNV0724	PNV0725	PNV0726	PNV0727
Collection Date	10/09/96	10/09/96	10/09/96	10/09/96	10/09/96	10/09/96	10/09/96	10/09/96	10/09/96	10/09/96
Depth (ft)	1.5-2.5	12.5-13.5	2.5-3.5	3.5-4.5	11.5-12.5	5.5-6.5	6.5-7.5	7.5-8.5	9.5-10.5	8.5-9.5
Duplicate ID										
Northing	232818	232818	232818	232818	232818	232818	232818	232818	232818	232818
Easting	704991	704991	704991	704991	704991	704991	704991	704991	704991	704991
Uranium-235 (pCi/g)	0.14	0.18	0.19	0.24	0.16	0.16	0.24	0.17	0.18	0.15
Uranium-238 (pCi/g)	0.71 U	2.91 U	1.7 U	3.78 U	1.08 U	1.28 U	1.51 U	1.88 U	0.9 U	2.24 U

Station	**IAA-BH0104**	**IAA-BH0104**	**IAA-BH0106**	**IAA-BH0113**	**IAA-BH0126**	**IAA-BH0126**	**IAA-BH0126**	**IAA-BH0126**	**IAA-BH0126**	**IAA-BH0130**
Sample No	**PNV0728**	**PNV0729**	**PNV0688**	**PNV0665**	**PNV0740**	**PNV0741**	**PNV0742**	**PNV0744**	**PNV0745**	**PNV0823**
Collection Date	**10/09/96**	**10/09/96**	**09/30/96**	**10/14/96**	**10/15/96**	**10/15/96**	**10/15/96**	**10/15/96**	**10/15/96**	**10/17/96**
Depth (ft)	**10.5-11.5**	**4.5-5.5**	**3.5-4.5**	**2.5-3.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**3.5-4.5**	**2.5-3.5**	**1.5-2.5**
Duplicate ID										
Northing	**232818**	**232818**	**232841**	**232808**	**232817**	**232817**	**232817**	**232817**	**232817**	**232820**
Easting	**704991**	**704991**	**704995**	**704982**	**704935**	**704935**	**704935**	**704935**	**704935**	**704925**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)									0.68	
Thorium-227 (pCi/g)									0.85 U	
Thorium-228 (pCi/g)	1.3	1.25	1.49	1.36	1.12	1.86	1.55	1.98	1.57	0.93
Thorium-230 (pCi/g)	1.3	1.92	2.52	4.23	1.91	2.17	2.21	2.38	2.28	1.58
Thorium-232 (pCi/g)	1.34	1.33	1.4	0.9	1.22	1.3	1.24	0.9	1.09	1.14
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)									1.6	
Uranium-235 (pCi/g)									0.07 UJ	
Uranium-238 (pCi/g)									1.77 J	
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.52 U	0.62 U	0.4	0.64 U	0.6 U	0.58 U	0.54 U	0.59 U	0.62 UJ	0.52 U
Actinium-228 (pCi/g)									1.1	
Americium-241 (pCi/g)	0.21 U	0.25 U	0.34 U	0.35 U	0.25 U	0.25 U	0.23 U	0.25 U	0.19 UJ	0.14 U
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)									1.3	
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	0.05 U	0.06 U	0.07 U	0.08 U	0.02 U	0.15	0.08	0.06		0.06
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)									0.44 UJ	
Lead-212 (pCi/g)									0.86	
Lead-214 (pCi/g)									1.3	
Neodymium-147 (pCi/g)									0.35	
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	22.92	27.73	20.15	14.68	23.32	19.38	19.27	17.74	16.6	16.93
Protactinium-231 (pCi/g)	1.57 U	1.77 U	2.19 U	2.35 U	1.78 U	1.82 U	1.64 U	1.83 U	4.6 UJ	1.61 U
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)									0.84	
Radium-226 (pCi/g)	0.95	1.07	6.12	8.43	1.02	2.3	1.32	2.09	1.3	1.47
Radium-228 (pCi/g)	1.14	1.47	1.03	1	1.2	1.08	1.15	1.12	1.1	0.96
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	1.14	1.47	1.03	1	1.2	1.08	1.15	1.12	1.1	0.96
Thorium-230 (pCi/g)	17.1 U	20.1 U	28 U	29.9 U	20.3 U	21.3 U	18.4 U	20.9 U		18 U
Thorium-232 (pCi/g)	1.14	1.47	1.03	1	1.2	1.08	1.15	1.12	1.1	0.96
Thorium-234 (pCi/g)									0.7 UJ	

Station	IAA-BH0104	IAA-BH0104	IAA-BH0106	IAA-BH0113	IAA-BH0126	IAA-BH0126	IAA-BH0126	IAA-BH0126	IAA-BH0126	IAA-BH0130
Sample No	PNV0728	PNV0729	PNV0688	PNV0665	PNV0740	PNV0741	PNV0742	PNV0744	PNV0745	PNV0823
Collection Date	10/09/96	10/09/96	09/30/96	10/14/96	10/15/96	10/15/96	10/15/96	10/15/96	10/15/96	10/17/96
Depth (ft)	10.5-11.5	4.5-5.5	3.5-4.5	2.5-3.5	0.0-0.5	0.5-1.5	1.5-2.5	3.5-4.5	2.5-3.5	1.5-2.5
Duplicate ID										
Northing	232818	232818	232841	232808	232817	232817	232817	232817	232817	232820
Easting	704991	704991	704995	704982	704935	704935	704935	704935	704935	704925
Uranium-235 (pCi/g)	0.15	0.14	0.71	0.82	0.19	0.36	0.22	0.34	0.23	0.27
Uranium-238 (pCi/g)	2.38 U	0.3 U	3.73	2.59 U	1.9 U	2.24 U	2.57 U	1.68 U	0.7 UJ	1.08 U

Station	**IAA-BH0131**	**IAA-BH0132**	**IAA-BH0132**	**IAA-BH0132**	**IAA-BH0132**	**IAA-BH0132**	**IAA-BH0132**	**IAA-BH0132**	**IAA-BH0132**	**IAA-14**
Sample No	**PNV0836**	**PNV0785**	**PNV0843**	**PNV0845**	**PNV0846**	**PNV0847**	**PNV0848**	**PNV0849**	**PNV0850**	**PNV046**
Collection Date	**10/17/96**	**10/22/96**	**10/22/96**	**10/22/96**	**10/22/96**	**10/22/96**	**10/22/96**	**10/22/96**	**10/22/96**	**10/17/98**
Depth (ft)	**1.5-2.5**	**4.5-5.5**	**1.5-2.5**	**3.5-4.5**	**5.5-6.5**	**6.5-7.5**	**7.5-8.5**	**8.5-9.5**	**9.5-10.5**	**1.5-1.5**
Duplicate ID										
Northing	**232827**	**232817**	**232817**	**232817**	**232817**	**232817**	**232817**	**232817**	**232817**	**232826**
Easting	**704935**	**704935**	**704935**	**704935**	**704935**	**704935**	**704935**	**704935**	**704935**	**705004**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)		1.53								4.25
Thorium-227 (pCi/g)		0.35								
Thorium-228 (pCi/g)	0.98	1.73	1.36	1.55	1.68	1.39	1.71	1.19	1.25	
Thorium-230 (pCi/g)	1.43	2.88	1.69	1.36	1.67	2.08	2.01	1.24	1.77	
Thorium-232 (pCi/g)	1.09	1.21	1.14	0.93	1.2	1.32	1.47	1.25	1.17	
Uranium-233/234 (pCi/g)										
Uranium-234 (pCi/g)		2.59								
Uranium-235 (pCi/g)		0.51 J								
Uranium-238 (pCi/g)		2.78								
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)	0.22 U	1.4 UJ	0.6 U	0.64 U	0.55 U	0.58 U	0.57 U	0.56 U	0.53 U	
Actinium-228 (pCi/g)		1.4								
Americium-241 (pCi/g)	0.25 U	0.32 UJ	0.26 U	0.27 U	0.23 U	0.23 U	0.23 U	0.23 U	0.21 U	
Bismuth-212 (pCi/g)										
Bismuth-214 (pCi/g)		2.6								
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	0.06 U		0.11	0.01 U	0.03 U	0.06 U	0.06 U	0.06 U	0.05 U	
Cobalt-60 (pCi/g)										
Lead-210 (pCi/g)		3.5 UJ								
Lead-212 (pCi/g)		2 J								
Lead-214 (pCi/g)		2.6								
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)	19.91	13	18.79	18.92	21.2	25.49	23.55	26.41	23.05	
Protactinium-231 (pCi/g)	1.77 U	6.2 UJ	1.75 U	2 U	1.65 U	1.75 U	1.69 U	1.67 U	1.56 U	
Protactinium-234 (pCi/g)										
Radium-224 (pCi/g)		2 J								
Radium-226 (pCi/g)	2.07	2.6	1.49	2.18	1.38	1.2	1.04	1.19	1.11	
Radium-228 (pCi/g)	1.1	1.4	1.02	1.1	1.12	1.25	1.14	1.22	1.06	
Thallium-208 (pCi/g)										
Thorium-228 (pCi/g)	1.1	1.4	1.02	1.1	1.12	1.25	1.14	1.22	1.06	
Thorium-230 (pCi/g)	20.1 U		20.2 U	22.2 U	18.7 U	19.4 U	18.6 U	18.3 U	17.8 U	
Thorium-232 (pCi/g)	1.07	1.4	1.02	1.1	1.12	1.25	1.14	1.22	1.06	
Thorium-234 (pCi/g)										

Station	IAA-BH0131	IAA-BH0132	IAA-BH0132	IAA-BH0132	IAA-BH0132	IAA-BH0132	IAA-BH0132	IAA-BH0132	IAA-BH0132	IAA-14
Sample No	PNV0836	PNV0785	PNV0843	PNV0845	PNV0846	PNV0847	PNV0848	PNV0849	PNV0850	PNV046
Collection Date	10/17/96	10/22/96	10/22/96	10/22/96	10/22/96	10/22/96	10/22/96	10/22/96	10/22/96	10/17/98
Depth (ft)	1.5-2.5	4.5-5.5	1.5-2.5	3.5-4.5	5.5-6.5	6.5-7.5	7.5-8.5	8.5-9.5	9.5-10.5	1.5-1.5
Duplicate ID										
Northing	232827	232817	232817	232817	232817	232817	232817	232817	232817	232826
Easting	704935	704935	704935	704935	704935	704935	704935	704935	704935	705004
Uranium-235 (pCi/g)	0.33	0.49	0.19	0.29	0.18	0.21	0.14	0.19	0.14	
Uranium-238 (pCi/g)	2.38 U	3.5 UJ	1.68 U	1.51 U	0.38 U	0.82 U	2.22 U	0.79 U	2 U	

Station	**IAA-1**	**IAA-2**	**IAA-3**	**IAA-5**	**IAA-8**	**IAA-SB0001**	**IAA-SB0002**	**IAA-SB0003**	**IAA-SB0004**	**IAA-SB0004**	**IAA-SB0005**
Sample No	**PNV034**	**PNV035**	**PNV036**	**PNV037**	**PNV040**	**PVSB0001**	**PVSB0004**	**PVSB0007**	**PVSB0010**	**PVSB0010D**	**PVSB0013**
Collection Date	**10/17/98**	**10/17/98**	**10/16/98**	**10/16/98**	**10/16/98**	**09/12/00**	**09/12/00**	**09/13/00**	**09/13/00**	**09/13/00**	**09/13/00**
Depth (ft)	**2.3-4.3**	**2.0-4.0**	**4.5-6.4**	**1.5-1.5**	**0.5-0.5**	**0.5-1.5**	**0.3-1.3**	**1.7-2.5**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**
Duplicate ID										**PVSB9002**	
Northing	**232829**	**232826**	**232824**	**232825**	**232821**	**232889**	**232874**	**232859**	**232788**	**232788**	**232792**
Easting	**704987**	**704988**	**704988**	**705001**	**705009**	**704997**	**705005**	**704997**	**704955**	**704955**	**704971**
Radiological Parameters											
Radiological Parameters (AlphaSpec)											
Radium-226 (pCi/g)	221.6	124.1	54.92	26.83	45.22						
Thorium-227 (pCi/g)											
Thorium-228 (pCi/g)						2.23 J	1.45 J	0.93	0.76	1.27	2.45
Thorium-230 (pCi/g)						13.47 J	7.34 J	2.63	2.28	1.65	3.33
Thorium-232 (pCi/g)						3.05 J	2.14	1.22	1.4	1.35	1
Uranium-233/234 (pCi/g)						17.98	9.56	3.85	1.47	1.83	5.27
Uranium-234 (pCi/g)											
Uranium-235 (pCi/g)						0.33 U	0.32 U	0.1 U	0.09 U	0.12 U	0.47 J
Uranium-238 (pCi/g)						15.8 J	7.46 J	4.01 J	1.54 J	1.82 J	3.34
Radiological Parameters (GammaSpec)											
Actinium-227 (pCi/g)											
Actinium-228 (pCi/g)						1.46	1.49 J	0.91	1.8	1.77 J	1.11
Americium-241 (pCi/g)											
Bismuth-212 (pCi/g)						0.4 U	1.14 U	0.72 J	1.51 J	1.09 U	0.84 J
Bismuth-214 (pCi/g)						17.87	22.47	3.1	2.72	2.45	11.22
Cadmium-109 (pCi/g)											
Cesium-137 (pCi/g)						0.04 U	0.14 U	0.04 U	-0.06 U	0.51	0.33
Cobalt-60 (pCi/g)						0.05 U	0.12 U	0.05 U	0.04 U	-0.03 U	0.03 U
Lead-210 (pCi/g)											
Lead-212 (pCi/g)						0.89	1.12 U	2.66	1.95 U	2.28	2.1
Lead-214 (pCi/g)						17.36	23.82 U	3.2	2.48 U	2.53	10.84
Neodymium-147 (pCi/g)											
Niobium-95 (pCi/g)											
Potassium-40 (pCi/g)											
Protactinium-231 (pCi/g)											
Protactinium-234 (pCi/g)						14.75 J	11.09 U	2.89 U	-3.8 U	4.58 U	8.69 U
Radium-224 (pCi/g)											
Radium-226 (pCi/g)						17.62	23.15	2.88	2.33 U	2.37	11.03
Radium-228 (pCi/g)											
Thallium-208 (pCi/g)						1.1	1.18	0.98	0.98	1.76	1.09
Thorium-228 (pCi/g)											
Thorium-230 (pCi/g)											
Thorium-232 (pCi/g)											
Thorium-234 (pCi/g)						21.74	22.26	2.64 J	1.82 U	1.88 U	7.45

Station	IAA-1	IAA-2	IAA-3	IAA-5	IAA-8	IAA-SB0001	IAA-SB0002	IAA-SB0003	IAA-SB0004	IAA-SB0004	IAA-SB0005
Sample No	**PNV034**	**PNV035**	**PNV036**	**PNV037**	**PNV040**	**PVSB0001**	**PVSB0004**	**PVSB0007**	**PVSB0010**	**PVSB0010D**	**PVSB0013**
Collection Date	**10/17/98**	**10/17/98**	**10/16/98**	**10/16/98**	**10/16/98**	**09/12/00**	**09/12/00**	**09/13/00**	**09/13/00**	**09/13/00**	**09/13/00**
Depth (ft)	**2.3-4.3**	**2.0-4.0**	**4.5-6.4**	**1.5-1.5**	**0.5-0.5**	**0.5-1.5**	**0.3-1.3**	**1.7-2.5**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**
Duplicate ID										**PVSB9002**	
Northing	**232829**	**232826**	**232824**	**232825**	**232821**	**232889**	**232874**	**232859**	**232788**	**232788**	**232792**
Easting	**704987**	**704988**	**704988**	**705001**	**705009**	**704997**	**705005**	**704997**	**704955**	**704955**	**704971**
Uranium-235 (pCi/g)											
Uranium-238 (pCi/g)											

Station	IAA-SB0006	IAA-SB0007	IAA-SB0007	IAA-SB0007	IAA-SB0008	IAA-SB0009	IAA-SB0010	IAA-SB0011	IAA-SB0012	IAA-SB0013
Sample No	**PVSB0016**	**PVSB0019**	**PVSB0236**	**PVSB0019D**	**PVSB0022**	**PVSB0025**	**PVSB0028**	**PVSB0031**	**PVSB0034**	**PVSB0037**
Collection Date	**09/14/00**	**09/14/00**	**09/21/00**	**09/14/00**	**09/14/00**	**09/14/00**	**09/14/00**	**09/14/00**	**09/14/00**	**09/15/00**
Depth (ft)	**0.0-1.0**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**	**0.0-1.0**	**0.0-1.0**	**1.0-2.0**	**0.7-1.2**	**0.0-0.5**	**0.0-1.0**
Duplicate ID				**PVSB9003**						
Northing	**232806**	**232823**	**232823**	**232823**	**232801**	**232801**	**232824**	**232819**	**232812**	**232913**
Easting	**704969**	**704971**	**704971**	**704971**	**704934**	**704938**	**704986**	**704994**	**704946**	**704992**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)										
Thorium-228 (pCi/g)	0.93 J	1.81		1.55	1.45 J	2.11	11.42 J	1.11 U	1.16	1.96 J
Thorium-230 (pCi/g)	8.6	2.88		2.98	7.14	3.34	422	154.4	2.9	188
Thorium-232 (pCi/g)	1.63	1.64		1.94	1.18 J	0.9 J	5.4 U	5.15 J	1.11	3
Uranium-233/234 (pCi/g)	4.59	5.62		2.25	7.86	9.19	114.3	85.13	6.18	71.67
Uranium-234 (pCi/g)										
Uranium-235 (pCi/g)	0.29 U	0.71 J		0.23 U	0.47 U	0.14 U	12.02 U	10.36 U	0.34 J	3.12
Uranium-238 (pCi/g)	5.66	2.51		1.12	7.69	6.51	80.8	77.52	3.83	70.74
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)										
Actinium-228 (pCi/g)	0.96 J	0.7		0.92	1.09 J	0.9	1.45 J	1.3 J	0.83	0.63 J
Americium-241 (pCi/g)										
Bismuth-212 (pCi/g)	-0.44 U	0.53 U		0.82 J	0.53 U	0.76 J	2.72 J	-0.17 U	0.73 J	0.47 U
Bismuth-214 (pCi/g)	16.43	1.3		1.3	11.73	2.6	309.5	170.8	3.56	38.69
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	0.29	-0.02 U		-0.06 U	0.15 J	0.12 J	0.15 J	1.53	0.08 J	0.36 J
Cobalt-60 (pCi/g)	-0.01 U	0.01 U		0.01 U	0.19 U	0.01 U	0.38 J	-0.11 U	0.04 U	-0.03 U
Lead-210 (pCi/g)										
Lead-212 (pCi/g)	0.91	1.21		1.07 U	0.88	2.89	0.99 J	23.69	1.37	1.96
Lead-214 (pCi/g)	18.35	1.42		1 U	11.36	2.8	307.9	185.3	4.28	42.7
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)										
Protactinium-231 (pCi/g)										
Protactinium-234 (pCi/g)	20.97 J	-1.36 U		5.28 U	10.21 U	3.07 U	46.62 J	19.59 U	1.68 U	38.59 J
Radium-224 (pCi/g)										
Radium-226 (pCi/g)	17.39	1.36		1.15 J	11.55	2.7	308.7	178.05	3.92	40.7
Radium-228 (pCi/g)										
Thallium-208 (pCi/g)	0.91	0.93		0.8	1.05	0.83	1.53 J	1.41 J	0.54	0.74 J
Thorium-228 (pCi/g)										
Thorium-230 (pCi/g)										
Thorium-232 (pCi/g)										
Thorium-234 (pCi/g)	9.43	1.03 U		1.2 J	6.44 J	3.21	29.23	36.02	3.43 J	10.2

Station	IAA-SB0006	IAA-SB0007	IAA-SB0007	IAA-SB0007	IAA-SB0008	IAA-SB0009	IAA-SB0010	IAA-SB0011	IAA-SB0012	IAA-SB0013
Sample No	PVSB0016	PVSB0019	PVSB0236	PVSB0019D	PVSB0022	PVSB0025	PVSB0028	PVSB0031	PVSB0034	PVSB0037
Collection Date	09/14/00	09/14/00	09/21/00	09/14/00	09/14/00	09/14/00	09/14/00	09/14/00	09/14/00	09/15/00
Depth (ft)	0.0-1.0	0.5-1.5	0.5-1.5	0.5-1.5	0.0-1.0	0.0-1.0	1.0-2.0	0.7-1.2	0.0-0.5	0.0-1.0
Duplicate ID				PVSB9003						
Northing	232806	232823	232823	232823	232801	232801	232824	232819	232812	232913
Easting	704969	704971	704971	704971	704934	704938	704986	704994	704946	704992
Uranium-235 (pCi/g)										
Uranium-238 (pCi/g)										

Station	IAA-SB0014	IAA-SB0015	IAA-SB0016	IAA-SB0017	IAA-SB0018	IAA-SB0019	IAA-SB0020	IAA-SB0021	IAA-SB0021	IAA-SB0022
Sample No	**PVSB0040**	**PVSB0043**	**PVSB0046**	**PVSB0049**	**PVSB0052**	**PVSB0055**	**PVSB0058**	**PVSB0061**	**PVSB0061D**	**PVSB0064**
Collection Date	**09/15/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/18/00**	**09/18/00**	**09/18/00**
Depth (ft)	**5.9-7.4**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**1.8-2.5**	**0.5-1.5**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**
Duplicate ID									**PVSB9004**	
Northing	**232812**	**232824**	**232825**	**232843**	**232843**	**232864**	**232864**	**232874**	**232874**	**232881**
Easting	**705005**	**705003**	**705006**	**705001**	**704994**	**705005**	**705011**	**704993**	**704993**	**704994**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)										
Thorium-228 (pCi/g)	1.48	1	1.41 J	0.64 J	0.73 J	1.56 U	1.87 J	1.01	0.87	0.93
Thorium-230 (pCi/g)	2.09	4.16	12.38	1.54	1.76	160	9.07	2.91	2.87	7.2
Thorium-232 (pCi/g)	1.19	0.83 J	2.12 J	0.96	1.49	9.34 J	1.07 U	0.58	0.89	1.18
Uranium-233/234 (pCi/g)	2.35	14.25	11.89	2.92	4.17	50.43	21.58	10.96	10.13	18.28
Uranium-234 (pCi/g)										
Uranium-235 (pCi/g)	0.28 U	0.72 J	0.74 U	0.03 U	0.31 U	1.03 U	0.05 U	0.44	0.51 J	0.83 J
Uranium-238 (pCi/g)	2	14.06	13.04	1.43	3.17	49.18	25.2	9.75	10.61	20.24
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)										
Actinium-228 (pCi/g)	0.87	0.64 J	0.87	0.51 J	1.1	0.93 J	0.85 J	0.84	0.77 J	1.03 J
Americium-241 (pCi/g)										
Bismuth-212 (pCi/g)	0.64 U	1.16 J	0.57 U	0.53 J	1.12 J	1.52 J	0.5 U	1.29 J	0.89 J	1.04 U
Bismuth-214 (pCi/g)	0.83	7.43	12.56	1.14	2.11	76.15	8.38	6.48	6.52	18.25
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	-0.02 U	0.11 J	0.06 J	0.12 J	-0.02 U	0.09 U	0.03 U	0.25 J	0.21 J	0.33
Cobalt-60 (pCi/g)	0.12 U	-0.05 U	0.03 U	-0.02 U	0.01 U	-0.04 U	0.02 U	0.06 U	0.03 U	0.04 U
Lead-210 (pCi/g)										
Lead-212 (pCi/g)	1.05	2.01	0.79	0.69	1.06	2.01	0.93	1.79	1.42	1.01
Lead-214 (pCi/g)	0.77	8.81	12.63	1.21	2.19	74.93	8.45	6.37	7.54	19.77
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)										
Protactinium-231 (pCi/g)										
Protactinium-234 (pCi/g)	2.93 U	4.33 U	5.07 U	3.89 U	3.87 U	27.06 J	8.72 U	7.99 U	9.01 J	44.83
Radium-224 (pCi/g)										
Radium-226 (pCi/g)	0.8	8.12	12.6	1.18	2.15	75.54	8.42	6.42	7.03	19.01
Radium-228 (pCi/g)										
Thallium-208 (pCi/g)	0.78	0.65	0.78	0.57	0.74	1.19	0.64	0.72	0.87	0.81 J
Thorium-228 (pCi/g)										
Thorium-230 (pCi/g)										
Thorium-232 (pCi/g)										
Thorium-234 (pCi/g)	0.23 U	7.24	6.56	0.6 U	2.11 J	16.67	7.13	9.1	8.33	28.81

Station	**IAA-SB0014**	**IAA-SB0015**	**IAA-SB0016**	**IAA-SB0017**	**IAA-SB0018**	**IAA-SB0019**	**IAA-SB0020**	**IAA-SB0021**	**IAA-SB0021**	**IAA-SB0022**
Sample No	**PVSB0040**	**PVSB0043**	**PVSB0046**	**PVSB0049**	**PVSB0052**	**PVSB0055**	**PVSB0058**	**PVSB0061**	**PVSB0061D**	**PVSB0064**
Collection Date	**09/15/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/18/00**	**09/18/00**	**09/18/00**
Depth (ft)	**5.9-7.4**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**1.8-2.5**	**0.5-1.5**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**
Duplicate ID									**PVSB9004**	
Northing	**232812**	**232824**	**232825**	**232843**	**232843**	**232864**	**232864**	**232874**	**232874**	**232881**
Easting	**705005**	**705003**	**705006**	**705001**	**704994**	**705005**	**705011**	**704993**	**704993**	**704994**
Uranium-235 (pCi/g)										
Uranium-238 (pCi/g)										

Station	IAA-SB0023	IAA-SB0024	IAA-SB0025	IAA-SB0026	IAA-SB0026	IAA-SB0027	IAA-SB0027	IAA-SB0028	IAA-SB0029	IAA-SB0030
Sample No	**PVSB0067**	**PVSB0070**	**PVSB0073**	**PVSB0076**	**PVSB0076D**	**PVSB0079**	**PVSB0079D**	**PVSB0082**	**PVSB0085**	**PVSB0088**
Collection Date	**09/18/00**	**09/18/00**	**09/18/00**	**09/18/00**	**09/18/00**	**09/18/00**	**09/18/00**	**09/18/00**	**09/18/00**	**09/19/00**
Depth (ft)	**0.0-1.0**	**0.0-1.0**	**6.0-8.0**	**0.5-1.5**	**0.5-1.5**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**8.0-10.0**	**0.5-1.5**
Duplicate ID					**PVSB9005**		**PVSB9007**			
Northing	**232892**	**232866**	**232912**	**232871**	**232871**	**232849**	**232849**	**232829**	**232802**	**232811**
Easting	**705004**	**704984**	**704992**	**704976**	**704976**	**704971**	**704971**	**704976**	**704986**	**704990**
Radiological Parameters										
Radiological Parameters (AlphaSpec)										
Radium-226 (pCi/g)										
Thorium-227 (pCi/g)										
Thorium-228 (pCi/g)	0.7	1.54	2.06	1.28	0.99	1.28	1.18	1.18	1.34	0.9
Thorium-230 (pCi/g)	8.96	2.24	1.5	1.69	1.3	1.78	1.35	4.92	3.02	1.68
Thorium-232 (pCi/g)	0.89	0.78	0.69	1.24	1.29	0.95	1.08	1	1.04	1.13
Uranium-233/234 (pCi/g)	10.26	4.04	2.11	1.57	2.1	2.42	2.84	11.31	4.58	1.68
Uranium-234 (pCi/g)										
Uranium-235 (pCi/g)	1.08 J	0.17 J	0.03 U	0.15 J	0.03 U	0.12 J	0.33 J	0.74 J	0.42 J	0.16 U
Uranium-238 (pCi/g)	11.79	3.96	2.13	1.62	1.26	2.7	1.91	10.61	3.96	1.07
Radiological Parameters (GammaSpec)										
Actinium-227 (pCi/g)										
Actinium-228 (pCi/g)	1.32 J	0.8	1.14	1.26	1.44	0.93	1.03 J	0.75	1.3	1.1
Americium-241 (pCi/g)										
Bismuth-212 (pCi/g)	-0.18 U	0.34 U	1.55 J	1.09 J	1.54 J	0.62 J	0.68 U	1.09 J	0.68 U	0.69 U
Bismuth-214 (pCi/g)	31.76	3.61	2.99	1.7	1.65	1.72	1.97	6.33	6.64	1.35
Cadmium-109 (pCi/g)										
Cesium-137 (pCi/g)	0.49 J	0.1 J	0.12 J	0.04 U	0.06 U	0.07 J	0.08 U	0.09 J	0.14 J	0.16 J
Cobalt-60 (pCi/g)	0.2 J	0.03 U	0.05 U	-0.04 U	0.02 U	0.01 U	-0.02 U	-0.01 U	0.02 U	-0.02 U
Lead-210 (pCi/g)										
Lead-212 (pCi/g)	4.24	1.15	1.46	1.6	2.91	1.23	2.17	1.06	1.12	1.97
Lead-214 (pCi/g)	34.31	3.96	3.12	1.82	1.59	1.67	1.66	6.69	7.28	1.44
Neodymium-147 (pCi/g)										
Niobium-95 (pCi/g)										
Potassium-40 (pCi/g)										
Protactinium-231 (pCi/g)										
Protactinium-234 (pCi/g)	19.22 U	4.71 U	7.15 U	3.83 U	0.94 U	9.66 J	-1.49 U	9.73 J	0.77 U	-3.28 U
Radium-224 (pCi/g)										
Radium-226 (pCi/g)	33.04	3.79	3.05	1.76	1.62	1.7	1.81	6.51	6.96	1.39
Radium-228 (pCi/g)										
Thallium-208 (pCi/g)	0.75 J	0.73	1.01	1.22	1.04	0.86	1	1.04	1.07	1.05
Thorium-228 (pCi/g)										
Thorium-230 (pCi/g)										
Thorium-232 (pCi/g)										
Thorium-234 (pCi/g)	36.28	3.8	7.36	4.49	5.77	2.57 J	3.74 J	11.11	8.54	2.46 J

Station	IAA-SB0023	IAA-SB0024	IAA-SB0025	IAA-SB0026	IAA-SB0026	IAA-SB0027	IAA-SB0027	IAA-SB0028	IAA-SB0029	IAA-SB0030
Sample No	PVSB0067	PVSB0070	PVSB0073	PVSB0076	PVSB0076D	PVSB0079	PVSB0079D	PVSB0082	PVSB0085	PVSB0088
Collection Date	09/18/00	09/18/00	09/18/00	09/18/00	09/18/00	09/18/00	09/18/00	09/18/00	09/18/00	09/19/00
Depth (ft)	0.0-1.0	0.0-1.0	6.0-8.0	0.5-1.5	0.5-1.5	8.0-10.0	0.5-1.5	0.5-1.5	8.0-10.0	0.5-1.5
Duplicate ID					PVSB9005		PVSB9007			
Northing	232892	232866	232912	232871	232871	232849	232849	232829	232802	232811
Easting	705004	704984	704992	704976	704976	704971	704971	704976	704986	704990
Uranium-235 (pCi/g)										
Uranium-238 (pCi/g)										

Station	**IAA-SB0030**	**IAA-SB0031**	**IAA-SB0032**	**IAA-SB0033**	**IAA-SB0034**	**IAA-SB0035**	**IAA-SB0036**	**IAA-SB0037**	**IAA-SB0038**
Sample No	**PVSB0088D**	**PVSB0091**	**PVSB0094**	**PVSB0097**	**PVSB0100**	**PVSB0103**	**PVSB0106**	**PVSB0206**	**PVSB0209**
Collection Date	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/20/00**	**09/21/00**
Depth (ft)	**0.5-1.5**	**8.0-9.0**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**0.0-0.5**
Duplicate ID	**PVSB9006**								
Northing	**232811**	**232817**	**232813**	**232804**	**232813**	**232822**	**232913**	**232843**	**232833**
Easting	**704990**	**704996**	**704959**	**704926**	**704946**	**705016**	**704994**	**704983**	**704984**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Radium-226 (pCi/g)									
Thorium-227 (pCi/g)									
Thorium-228 (pCi/g)	1.26 J	5.46 J	2.2 J	1.56	1.99 J	1.67	3	2.78 J	12.87 U
Thorium-230 (pCi/g)	2.87 J	98.47	6.79	2.39	11.75	2.11	3.25	11.43	76.33 J
Thorium-232 (pCi/g)	1.35 J	3.94 J	2.7 J	1.19	2.1	1.72	0.68	2.77 J	15.85 U
Uranium-233/234 (pCi/g)	5.56	294.8	6.08	4.61	7.22	2.58	5.65	11.8	121.1
Uranium-234 (pCi/g)									
Uranium-235 (pCi/g)	1 U	9.87	0.72 U	0.57 J	0.27 U	0.18 U	0.24 U	0.65 J	6.08 U
Uranium-238 (pCi/g)	4.73	282.7	4.73	3.67	4.75	2.54	5.42	9.79	15.74 J
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)									
Actinium-228 (pCi/g)	1.03	1.38 U	0.48 J	0.96	0.6 J	1.23	1.25	1.2	1.36 U
Americium-241 (pCi/g)									
Bismuth-212 (pCi/g)	0.78 J	0.31 U	0.51 J	0.56 J	1.44 J	0.66 J	0.81 J	0.5 U	2.24 U
Bismuth-214 (pCi/g)	1.24	135.4	3.42	2.4	18.94	0.74	6.94	7.35	963.9
Cadmium-109 (pCi/g)									
Cesium-137 (pCi/g)	0.13 J	0.21 U	0.08 J	0.1 J	0.38	-0.02 U	0.06 U	0.02 U	5.67
Cobalt-60 (pCi/g)	0.01 U	0.03 U	0.02 U	-0.05 U	0.04 U	-0.04 U	0.07 U	0.14 U	0.28 U
Lead-210 (pCi/g)									
Lead-212 (pCi/g)	1.32	3.66	0.95	1.09	3.34	1.52	1.36	1.53	32.16
Lead-214 (pCi/g)	1.34	143.4	3.36	1.79	19.35	0.92	7.99	7.51	760.1
Neodymium-147 (pCi/g)									
Niobium-95 (pCi/g)									
Potassium-40 (pCi/g)									
Protactinium-231 (pCi/g)									
Protactinium-234 (pCi/g)	-1.73 U	139.4 J	2.46 U	5.22 U	19.11 U	5.01 U	8.76 J	5.84 U	38.04 U
Radium-224 (pCi/g)									
Radium-226 (pCi/g)	1.29	139.4	3.39	2.1	19.15	0.83	7.47	7.43	862
Radium-228 (pCi/g)									
Thallium-208 (pCi/g)	0.94	1.36 J	0.56	0.92	1.08	1.1	1.03	1.1	5.37
Thorium-228 (pCi/g)									
Thorium-230 (pCi/g)									
Thorium-232 (pCi/g)									
Thorium-234 (pCi/g)	1.83 U	214.8	1.7 J	2.13 J	11.9	0.78 U	6.32	9.97	-11.76 U

Station	**IAA-SB0030**	**IAA-SB0031**	**IAA-SB0032**	**IAA-SB0033**	**IAA-SB0034**	**IAA-SB0035**	**IAA-SB0036**	**IAA-SB0037**	**IAA-SB0038**
Sample No	**PVSB0088D**	**PVSB0091**	**PVSB0094**	**PVSB0097**	**PVSB0100**	**PVSB0103**	**PVSB0106**	**PVSB0206**	**PVSB0209**
Collection Date	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/20/00**	**09/21/00**
Depth (ft)	**0.5-1.5**	**8.0-9.0**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**0.0-0.5**
Duplicate ID	**PVSB9006**								
Northing	**232811**	**232817**	**232813**	**232804**	**232813**	**232822**	**232913**	**232843**	**232833**
Easting	**704990**	**704996**	**704959**	**704926**	**704946**	**705016**	**704994**	**704983**	**704984**
Uranium-235 (pCi/g)									
Uranium-238 (pCi/g)									

IAB Soil Radiological Data

Station	**IAB-BH0089**	**IAB-BH0089**	**IAB-BH0089**	**IAB-BH0089**	**IAB-BH0089**	**IAB-BH0090**	**IAB-BH0091**	**IAB-BH0091**	**IAB-BH0092**
Sample No	**PNV0487**	**PNV0488**	**PNV0489**	**PNV0490**	**PNV0491**	**PNV0496**	**PNV0320**	**PNV0497**	**PNV0502**
Collection Date	**09/18/96**	**09/18/96**	**09/18/96**	**09/18/96**	**09/18/96**	**09/19/96**	**09/19/96**	**09/19/96**	**09/19/96**
Depth (ft)	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**3.5-4.5**	**0.5-1.0**	**0.0-0.5**	**0.0-0.5**
Duplicate ID									
Northing	**232893**	**232893**	**232893**	**232893**	**232893**	**232883**	**232882**	**232882**	**232876**
Easting	**705258**	**705258**	**705258**	**705258**	**705258**	**705246**	**705255**	**705255**	**705252**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Thorium-227 (pCi/g)							2.18 U		
Thorium-228 (pCi/g)		0.98	1.12	1.37	1.24	1.29	1.07		1.02
Thorium-230 (pCi/g)		6.08	3.05	2.05	2.64	1.43	6.38		3.17
Thorium-232 (pCi/g)		1.05	1.29	0.78	1.04	1.33	0.97		0.94
Uranium-233/234 (pCi/g)									
Uranium-234 (pCi/g)							0.11 UJ		
Uranium-235 (pCi/g)							0.11 UJ		
Uranium-238 (pCi/g)							0.09 UJ		
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	1.3	0.52	0.54 U	0.53 U	0.54 U	0.65 U	0.82 UJ	0.74	0.62 U
Actinium-228 (pCi/g)							0.64		
Americium-241 (pCi/g)	0.49 U	0.25 U	0.23 U	0.23 U	0.23 U	0.25 U	0.12 UJ	0.39 U	0.27 U
Bismuth-212 (pCi/g)							1.5 UJ		
Bismuth-214 (pCi/g)							2.3		
Cadmium-109 (pCi/g)							1.4 UJ		
Cesium-137 (pCi/g)	0.56	0.14	0.08	0.01 U	0.06 U	0.06 U		0.39	0.35
Cobalt-60 (pCi/g)									
Europium-155 (pCi/g)							0.17 UJ		
Lead-210 (pCi/g)							1.8 J		
Lead-212 (pCi/g)							0.63 J		
Lead-214 (pCi/g)							2.3		
Neodymium-147 (pCi/g)							0.38		
Potassium-40 (pCi/g)	4.93	3.68	15.12	14.34	15.97	18.62	3.4	6.71	10.18
Protactinium-231 (pCi/g)	3.34 U	1.73 U	1.67 U	1.61 U	1.63 U	1.94 U	3.2 UJ	1.59 U	1.95 U
Protactinium-234 (pCi/g)									
Radium-224 (pCi/g)							0.61		
Radium-226 (pCi/g)	10.64	5.33	2	1.65	1.16	0.96	2.3	7.47	1.88
Radium-228 (pCi/g)	0.51	0.66	0.98	1.02	0.96	1.3	0.64	0.84	1.1
Thallium-208 (pCi/g)									
Thorium-228 (pCi/g)	0.51	0.66	0.98	1.02	0.96	1.3	0.64	0.84	1.1
Thorium-230 (pCi/g)	40.8 U	20.4 U	20.1 U	18.6 U	18.6 U	21 U		32 U	20.9 U
Thorium-232 (pCi/g)	0.51	0.66	0.98	1.02	0.96	1.3	0.64	0.84	1.1
Thorium-234 (pCi/g)							1.4		
Uranium-235 (pCi/g)	1.62	0.73	0.33	0.31	0.19	0.11 U	0.26	1.49	0.3

Station	IAB-BH0089	IAB-BH0089	IAB-BH0089	IAB-BH0089	IAB-BH0089	IAB-BH0090	IAB-BH0091	IAB-BH0091	IAB-BH0092
Sample No	**PNV0487**	**PNV0488**	**PNV0489**	**PNV0490**	**PNV0491**	**PNV0496**	**PNV0320**	**PNV0497**	**PNV0502**
Collection Date	**09/18/96**	**09/18/96**	**09/18/96**	**09/18/96**	**09/18/96**	**09/19/96**	**09/19/96**	**09/19/96**	**09/19/96**
Depth (ft)	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**3.5-4.5**	**0.5-1.0**	**0.0-0.5**	**0.0-0.5**
Duplicate ID									
Northing	**232893**	**232893**	**232893**	**232893**	**232893**	**232883**	**232882**	**232882**	**232876**
Easting	**705258**	**705258**	**705258**	**705258**	**705258**	**705246**	**705255**	**705255**	**705252**
Uranium-238 (pCi/g)	2.74 U	1.9 U	1.21 U	1.84 U	0.91 U	3.49 U	1.4	5.8 U	2.72 U

Station	IAB-BH0099	IAB-BH0099	IAB-BH0099	IAB-BH0099	IAB-BH0099	IAB-SB0001	IAB-SB0002
Sample No	**PNV0538**	**PNV0539**	**PNV0540**	**PNV0541**	**PNV0542**	**PVSB0221**	**PVSB0218**
Collection Date	**09/19/96**	**09/19/96**	**09/19/96**	**09/19/96**	**09/19/96**	**09/20/00**	**09/20/00**
Depth (ft)	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.5-1.5**	**0.0-1.0**
Duplicate ID							
Northing	**232882**	**232882**	**232882**	**232882**	**232882**	**232904**	**232926**
Easting	**705253**	**705253**	**705253**	**705253**	**705253**	**705250**	**705232**
Radiological Parameters							
Radiological Parameters (AlphaSpec)							
Thorium-227 (pCi/g)							
Thorium-228 (pCi/g)	0.85		0.95	1.13	1.62	2.65 J	1.58
Thorium-230 (pCi/g)	2.71		1.6	1.16	1.81	10.47	4.52
Thorium-232 (pCi/g)	1.02		0.79	0.9	1.28	1.39 J	1.28
Uranium-233/234 (pCi/g)						8.33	2.07
Uranium-234 (pCi/g)							
Uranium-235 (pCi/g)						0.13 U	0.2 J
Uranium-238 (pCi/g)						8.35	1.92
Radiological Parameters (GammaSpec)							
Actinium-227 (pCi/g)	0.45	0.42 U	0.54 U	0.57 U	0.57 U		
Actinium-228 (pCi/g)						0.8 J	1.36
Americium-241 (pCi/g)	0.29 U	0.18 U	0.22 U	0.23 U	0.24 U		
Bismuth-212 (pCi/g)						0.53 U	1.08 J
Bismuth-214 (pCi/g)						9.64	1.21
Cadmium-109 (pCi/g)							
Cesium-137 (pCi/g)	0.39	0.04 U	0.05 U	0.06 U	0.06 U	0.01 U	0.1 J
Cobalt-60 (pCi/g)						-0.03 U	-0.04 U
Europium-155 (pCi/g)							
Lead-210 (pCi/g)							
Lead-212 (pCi/g)						-0.07 U	2.53
Lead-214 (pCi/g)						9.85	1.52
Neodymium-147 (pCi/g)							
Potassium-40 (pCi/g)	11.86	12.76	16.68	17.53	18.39		
Protactinium-231 (pCi/g)	2 U	1.24 U	1.61 U	1.68 U	1.77 U		
Protactinium-234 (pCi/g)						29.46 J	4.06 U
Radium-224 (pCi/g)							
Radium-226 (pCi/g)	4.8	0.82	0.96	0.95	0.91	9.74	1.37
Radium-228 (pCi/g)	0.92	0.79	0.88	1.03	1.09		
Thallium-208 (pCi/g)						0.5 J	0.88
Thorium-228 (pCi/g)	0.92	0.79	0.88	1.03	1.09		
Thorium-230 (pCi/g)	23.6 U	14.5 U	9.19 U	19.1 U	18.7 U		
Thorium-232 (pCi/g)	0.92	0.79	0.88	1.03	1.09		
Thorium-234 (pCi/g)						4.47 J	2.44 J
Uranium-235 (pCi/g)	0.48	0.13	0.16	0.13	0.19		

Station	IAB-BH0099	IAB-BH0099	IAB-BH0099	IAB-BH0099	IAB-BH0099	IAB-SB0001	IAB-SB0002
Sample No	PNV0538	PNV0539	PNV0540	PNV0541	PNV0542	PVSB0221	PVSB0218
Collection Date	09/19/96	09/19/96	09/19/96	09/19/96	09/19/96	09/20/00	09/20/00
Depth (ft)	0.0-0.5	0.5-1.5	1.5-2.5	2.5-3.5	3.5-4.5	0.5-1.5	0.0-1.0
Duplicate ID							
Northing	232882	232882	232882	232882	232882	232904	232926
Easting	705253	705253	705253	705253	705253	705250	705232
Uranium-238 (pCi/g)	4.87 U	1.12 U	1.33 U	1.54 U	3.68 U		

Station	IAC-BH0008	IAC-BH0008	IAC-BH0009	IAC-BH0009	IAC-BH0054	IAC-BH0054	IAC-BH0054	IAC-BH0054	IAC-BH0055
Sample No	**PNV0605**	**PNV0606**	**PNV0677**	**PNV0758**	**PNV0291**	**PNV0292**	**PNV0293**	**PNV0294**	**PNV0296**
Collection Date	**10/08/96**	**10/08/96**	**10/14/96**	**10/14/96**	**09/09/96**	**09/09/96**	**09/09/96**	**09/09/96**	**09/10/96**
Depth (ft)	**0.0-1.0**	**1.0-2.0**	**0.0-0.5**	**0.5-1.5**	**0.0-0.5**	**0.5-1.3**	**1.5-2.5**	**2.5-3.2**	**0.0-0.5**
Duplicate ID									
Northing	**232801**	**232801**	**232776**	**232776**	**232778**	**232778**	**232778**	**232778**	**232767**
Easting	**705255**	**705255**	**705261**	**705261**	**705253**	**705253**	**705253**	**705253**	**705260**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Radium-226 (pCi/g)			27.39 J						
Thorium-227 (pCi/g)			4.53						
Thorium-228 (pCi/g)	0.61	0.79	83.27 J		0.72	1.28	0.84	1.15	
Thorium-230 (pCi/g)	5.58	1.94	36.84		7.68	22.99	30.33	21.68	
Thorium-232 (pCi/g)	0.7	0.71	1.96		0.57	1.42	0.85	0.72	
Uranium-233/234 (pCi/g)									
Uranium-234 (pCi/g)			41.74						
Uranium-235 (pCi/g)			1.51 J						
Uranium-238 (pCi/g)			41.96						
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	1.05	0.36	1.9 UJ	1.85	0.39	1.28	1	0.37	1.93
Actinium-228 (pCi/g)			1.1 J						
Americium-241 (pCi/g)	0.39 U	0.29 U	0.4 UJ	0.79 U	0.26 U	0.4 U	0.41 U	0.25 U	0.79 U
Bismuth-212 (pCi/g)									
Bismuth-214 (pCi/g)			23.3						
Cadmium-109 (pCi/g)			15.1						
Cesium-137 (pCi/g)	0.28	0.06		0.17 U	0.07	0.57	0.33	0.06	0.1 U
Cobalt-60 (pCi/g)									
Europium-155 (pCi/g)			1.8						
Lead-210 (pCi/g)			19.3						
Lead-212 (pCi/g)			0.67						
Lead-214 (pCi/g)			23.3						
Neodymium-147 (pCi/g)			1.9 J						
Niobium-95 (pCi/g)			1.3						
Potassium-40 (pCi/g)	9.57	16.42	8.2	5.98	11.87	11.55	17.39	18.02	12.91
Protactinium-231 (pCi/g)	2.61 U	1.93 U	8.1 UJ	5.14 U	1.81 U	2.64 U	2.74 U	1.81 U	5.38 U
Protactinium-234 (pCi/g)									
Protactinium-234m (pCi/g)			2 UJ						
Radium-224 (pCi/g)			0.65 J						
Radium-226 (pCi/g)	12.02	2.77	23.3	26.71	3.93	13.34	12.67	3.25	20.46
Radium-228 (pCi/g)	0.59	0.94	1.1	1.05	0.75	0.74	0.78	0.72	0.79
Thallium-208 (pCi/g)									
Thorium-228 (pCi/g)	0.59	0.94	1.1	1.05	0.75	0.74	0.78	0.72	0.79
Thorium-230 (pCi/g)	33.1 U	22.6 U		64.4 U	21.4 U	3.85 U	3.03 U	2.81 U	66.2 U

Station	IAC-BH0008	IAC-BH0008	IAC-BH0009	IAC-BH0009	IAC-BH0054	IAC-BH0054	IAC-BH0054	IAC-BH0054	IAC-BH0055
Sample No	PNV0605	PNV0606	PNV0677	PNV0758	PNV0291	PNV0292	PNV0293	PNV0294	PNV0296
Collection Date	10/08/96	10/08/96	10/14/96	10/14/96	09/09/96	09/09/96	09/09/96	09/09/96	09/10/96
Depth (ft)	0.0-1.0	1.0-2.0	0.0-0.5	0.5-1.5	0.0-0.5	0.5-1.3	1.5-2.5	2.5-3.2	0.0-0.5
Duplicate ID									
Northing	232801	232801	232776	232776	232778	232778	232778	232778	232767
Easting	705255	705255	705261	705261	705253	705253	705253	705253	705260
Thorium-232 (pCi/g)	0.59	0.94	1.1	1.05	0.75	0.74	0.78	0.72	0.79
Thorium-234 (pCi/g)			7.3						
Uranium-235 (pCi/g)	1.7	0.42	4 J	2.8	0.62	1.85	1.36	0.47	3.05
Uranium-238 (pCi/g)	7.96	0.85 U	7.3	14.44	4.65	12.31	8.16	2.08 U	8.47 U

Station	IAC-BH0055	IAC-BH0055	IAC-BH0055	IAC-BH0055	IAC-BH0055	IAC-BH0056	IAC-BH0056	IAC-BH0056	IAC-BH0056
Sample No	**PNV0297**	**PNV0298**	**PNV0299**	**PNV0300**	**PNV0305**	**PNV0301**	**PNV0302**	**PNV0303**	**PNV0304**
Collection Date	**09/10/96**	**09/10/96**	**09/10/96**	**09/10/96**	**09/10/96**	**09/06/96**	**09/06/96**	**09/06/96**	**09/06/96**
Depth (ft)	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.0**
Duplicate ID									
Northing	**232767**	**232767**	**232767**	**232767**	**232767**	**232756**	**232756**	**232756**	**232756**
Easting	**705260**	**705260**	**705260**	**705260**	**705260**	**705251**	**705251**	**705251**	**705251**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Radium-226 (pCi/g)									
Thorium-227 (pCi/g)					1.36				
Thorium-228 (pCi/g)	1.2	1.85	1.42	1.66	1.22 U	0.19 U		1.19	1.17
Thorium-230 (pCi/g)	7.93	1.24	2.15	2	7.22	1.87		2.03	2.21
Thorium-232 (pCi/g)	1.54	1.54	1.47	1.06	0.93	0.27 U		0.96	1.07
Uranium-233/234 (pCi/g)									
Uranium-234 (pCi/g)					10				
Uranium-235 (pCi/g)					1.04				
Uranium-238 (pCi/g)					10.36				
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	0.65	0.53 U	0.52 U	0.48 U	2.2 UJ	0.21 U	1.55	0.55 U	0.55 U
Actinium-228 (pCi/g)									
Americium-241 (pCi/g)	0.36 U	0.22 U	0.21 U	0.2 U	0.55 UJ	0.12 U	0.59 U	0.23 U	0.24 U
Bismuth-212 (pCi/g)									
Bismuth-214 (pCi/g)					16.4				
Cadmium-109 (pCi/g)					11.1				
Cesium-137 (pCi/g)	0.05 U	0.05 U	0.05 U	0.05 U		0.01 U	0.12	0.06 U	0.06 U
Cobalt-60 (pCi/g)									
Europium-155 (pCi/g)									
Lead-210 (pCi/g)					13.9				
Lead-212 (pCi/g)					0.28 UJ				
Lead-214 (pCi/g)					16.4				
Neodymium-147 (pCi/g)					0.49 UJ				
Niobium-95 (pCi/g)									
Potassium-40 (pCi/g)	17.96	23.32	22.76	15	10 J	2.8	9.62	19.67	17.65
Protactinium-231 (pCi/g)	2.4 U	1.6 U	1.52 U	1.45 U	10.3 UJ	0.88 U	4.05 U	1.68 U	1.76 U
Protactinium-234 (pCi/g)									
Protactinium-234m (pCi/g)									
Radium-224 (pCi/g)					0.73				
Radium-226 (pCi/g)	9.95	1.24	1.08	0.76	16.4	0.61	15.95	1.17	1.5
Radium-228 (pCi/g)	1.05	1.23	1.21	0.91	1.1 UJ	0.03 U	0.63	1.11	0.95
Thallium-208 (pCi/g)									
Thorium-228 (pCi/g)	1.05	1.23	1.21	0.91	1.1 UJ	0.03 U	0.63	1.11	0.95
Thorium-230 (pCi/g)	30.4 U	18 U	17.6 U	15.9 U		3.02 U	49.8 U	18.2 U	6.27 U

Station	IAC-BH0055	IAC-BH0055	IAC-BH0055	IAC-BH0055	IAC-BH0055	IAC-BH0056	IAC-BH0056	IAC-BH0056	IAC-BH0056
Sample No	PNV0297	PNV0298	PNV0299	PNV0300	PNV0305	PNV0301	PNV0302	PNV0303	PNV0304
Collection Date	09/10/96	09/10/96	09/10/96	09/10/96	09/10/96	09/06/96	09/06/96	09/06/96	09/06/96
Depth (ft)	0.5-1.5	1.5-2.5	2.5-3.5	3.5-4.5	0.0-0.5	0.0-0.5	0.5-1.5	1.5-2.5	2.5-3.0
Duplicate ID									
Northing	232767	232767	232767	232767	232767	232756	232756	232756	232756
Easting	705260	705260	705260	705260	705260	705251	705251	705251	705251
Thorium-232 (pCi/g)	1.05	1.23	1.21	0.91	1.1 UJ	0.03 U	0.63	1.11	0.95
Thorium-234 (pCi/g)					5.1 UJ				
Uranium-235 (pCi/g)	1.21	0.17	0.19	0.14	2	0.08	2.01	0.18	0.24
Uranium-238 (pCi/g)	6.37	1.42 U	1.16 U	3.22	5.1 UJ	-0.02 U	7.24 U	0.96 U	1.87 U

Station	IAC-BH0057	IAC-BH0057	IAC-BH0057	IAC-BH0057	IAC-BH0058	IAC-BH0059	IAC-BH0060	IAC-BH0084	IAC-BH0084
Sample No	**PNV0306**	**PNV0307**	**PNV0308**	**PNV0427**	**PNV0315**	**PNV0316**	**PNV0325**	**PNV0448**	**PNV0449**
Collection Date	**09/10/96**	**09/10/96**	**09/10/96**	**09/10/96**	**09/09/96**	**09/10/96**	**09/06/96**	**09/11/96**	**09/11/96**
Depth (ft)	**0.0-0.5**	**0.5-1.5**	**1.5-1.7**	**0.0-0.5**	**3.5-4.5**	**0.0-0.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**
Duplicate ID									
Northing	**232746**	**232746**	**232746**	**232746**	**232801**	**232768**	**232728**	**232768**	**232768**
Easting	**705260**	**705260**	**705260**	**705260**	**705268**	**705273**	**705273**	**705271**	**705271**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Radium-226 (pCi/g)									
Thorium-227 (pCi/g)				1.41 J					
Thorium-228 (pCi/g)		1.2	1.2	0.7 UJ	1.46	1.03	1.95		2.38
Thorium-230 (pCi/g)		6.05	3.74	8.21 J	2.25	3.63	1.85		7.23
Thorium-232 (pCi/g)		1.17	0.81	0.63 J	1.39	0.91	1.79		1.35
Uranium-233/234 (pCi/g)									
Uranium-234 (pCi/g)				41.89 J					
Uranium-235 (pCi/g)				2.06 J					
Uranium-238 (pCi/g)				42.56 J					
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	2.13	0.39	0.58 U	0.93 UJ	0.55 U	0.47 U	0.51 U	1.54	0.48
Actinium-228 (pCi/g)				0.58 J					
Americium-241 (pCi/g)	0.57 U	0.26 U	0.27 U	0.31 UJ	0.22 U	0.24 U	0.2 U	0.35 U	0.26 U
Bismuth-212 (pCi/g)									
Bismuth-214 (pCi/g)				14.2					
Cadmium-109 (pCi/g)				9.5					
Cesium-137 (pCi/g)	0.11	0.05 U	0.06 U		0.05 U	0.09	0.05 U	0.68	0.18
Cobalt-60 (pCi/g)									
Europium-155 (pCi/g)				1.1 J					
Lead-210 (pCi/g)				9.6					
Lead-212 (pCi/g)				0.48					
Lead-214 (pCi/g)				14.2					
Neodymium-147 (pCi/g)				0.45 UJ					
Niobium-95 (pCi/g)				0.77 UJ					
Potassium-40 (pCi/g)	4.75	3.85	2.46	4.1 J	25.11	5.6	21.09	6.32	5.46
Protactinium-231 (pCi/g)	2.17	1.72 U	1.86 U	6.8 UJ	1.64 U	1.65 U	1.47 U	1.86	1.86 U
Protactinium-234 (pCi/g)									
Protactinium-234m (pCi/g)									
Radium-224 (pCi/g)									
Radium-226 (pCi/g)	13.82	4.39	3	14.2	0.89	2.47	0.88	8.95	5.31
Radium-228 (pCi/g)	0.5	0.83	1.06	0.58	1.24	0.51	1.01	0.46	0.58
Thallium-208 (pCi/g)									
Thorium-228 (pCi/g)	0.5	0.83	1.06	0.58	1.24	0.51	1.01	0.46	0.58
Thorium-230 (pCi/g)	48 U	20.7 U	22.1 U		18.2 U	19.5 U	17.1 U	30.1 U	21.6 U

Station	IAC-BH0057	IAC-BH0057	IAC-BH0057	IAC-BH0057	IAC-BH0058	IAC-BH0059	IAC-BH0060	IAC-BH0084	IAC-BH0084
Sample No	PNV0306	PNV0307	PNV0308	PNV0427	PNV0315	PNV0316	PNV0325	PNV0448	PNV0449
Collection Date	09/10/96	09/10/96	09/10/96	09/10/96	09/09/96	09/10/96	09/06/96	09/11/96	09/11/96
Depth (ft)	0.0-0.5	0.5-1.5	1.5-1.7	0.0-0.5	3.5-4.5	0.0-0.5	3.5-4.5	0.0-0.5	0.5-1.5
Duplicate ID									
Northing	232746	232746	232746	232746	232801	232768	232728	232768	232768
Easting	705260	705260	705260	705260	705268	705273	705273	705271	705271
Thorium-232 (pCi/g)	0.5	0.83	1.06	0.58	1.24	0.51	1.01	0.46	0.58
Thorium-234 (pCi/g)				4.4					
Uranium-235 (pCi/g)	2.19	0.72	0.69	2	0.16	0.36	0.13	1.73	0.73
Uranium-238 (pCi/g)	10.65	5.99	5.42	4.4	0.38 U	3.88	0.79 U	4.25 U	2.09 U

Station	IAC-BH0084	IAC-BH0084	IAC-BH0084	IAC-BH0096	IAC-BH0096	IAC-BH0096	IAC-BH0096	IAC-BH0097	IAC-BH0105
Sample No	**PNV0450**	**PNV0451**	**PNV0452**	**PNV0523**	**PNV0524**	**PNV0525**	**PNV0526**	**PNV0529**	**PNV0573**
Collection Date	**09/11/96**	**09/11/96**	**09/11/96**	**09/23/96**	**09/23/96**	**09/23/96**	**09/23/96**	**09/23/96**	**10/08/96**
Depth (ft)	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**0.5-1.5**	**0.0-1.0**
Duplicate ID									
Northing	**232768**	**232768**	**232768**	**232778**	**232778**	**232778**	**232778**	**232756**	**232780**
Easting	**705271**	**705271**	**705271**	**705248**	**705248**	**705248**	**705248**	**705249**	**705253**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Radium-226 (pCi/g)									
Thorium-227 (pCi/g)									
Thorium-228 (pCi/g)	1.6	0.98	1.26	0.76				1.29	1.01
Thorium-230 (pCi/g)	2.31	1.38	1.85	2.32				2.28	3.78
Thorium-232 (pCi/g)	1.03	1.25	1.21	0.27				1.18	0.98
Uranium-233/234 (pCi/g)									
Uranium-234 (pCi/g)									
Uranium-235 (pCi/g)									
Uranium-238 (pCi/g)									
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	0.53 U	0.54 U	0.53 U	0.27 U	0.33 U	0.34 U	0.38 U	0.32	0.43
Actinium-228 (pCi/g)									
Americium-241 (pCi/g)	0.21 U	0.22 U	0.21 U	0.15 U	0.16 U	0.15 U	0.18 U	0.25 U	0.29 U
Bismuth-212 (pCi/g)									
Bismuth-214 (pCi/g)									
Cadmium-109 (pCi/g)									
Cesium-137 (pCi/g)	0.05 U	0.05 U	0.05 U	0.03 U	0.02 U	0.04 U	0.04 U	0.06	0.07
Cobalt-60 (pCi/g)									
Europium-155 (pCi/g)									
Lead-210 (pCi/g)									
Lead-212 (pCi/g)									
Lead-214 (pCi/g)									
Neodymium-147 (pCi/g)									
Niobium-95 (pCi/g)									
Potassium-40 (pCi/g)	19.74	18.97	20.01	3.35	9.63	11.21	12.62	11.47	12.54
Protactinium-231 (pCi/g)	1.58 U	1.58 U	1.53 U	1.09 U	1.23 U	1.11 U	1.25 U	1.69 U	1.99 U
Protactinium-234 (pCi/g)									
Protactinium-234m (pCi/g)									
Radium-224 (pCi/g)									
Radium-226 (pCi/g)	1.02	1.01	1.03	1.09	1.09	0.79	1.21	2.86	4.69
Radium-228 (pCi/g)	1.08	0.99	1.06	0.2	0.47	0.46	0.61	0.82	0.66
Thallium-208 (pCi/g)									
Thorium-228 (pCi/g)	1.08	0.99	1.06	0.2	0.47	0.46	0.61	0.82	0.66
Thorium-230 (pCi/g)	17.1 U	17.5 U	17.7 U	12.3 U	13.5 U	12.8 U	14.5 U	20 U	23.7 U

Station	IAC-BH0084	IAC-BH0084	IAC-BH0084	IAC-BH0096	IAC-BH0096	IAC-BH0096	IAC-BH0096	IAC-BH0097	IAC-BH0105
Sample No	**PNV0450**	**PNV0451**	**PNV0452**	**PNV0523**	**PNV0524**	**PNV0525**	**PNV0526**	**PNV0529**	**PNV0573**
Collection Date	**09/11/96**	**09/11/96**	**09/11/96**	**09/23/96**	**09/23/96**	**09/23/96**	**09/23/96**	**09/23/96**	**10/08/96**
Depth (ft)	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**0.5-1.5**	**0.0-1.0**
Duplicate ID									
Northing	**232768**	**232768**	**232768**	**232778**	**232778**	**232778**	**232778**	**232756**	**232780**
Easting	**705271**	**705271**	**705271**	**705248**	**705248**	**705248**	**705248**	**705249**	**705253**
Thorium-232 (pCi/g)	1.08	0.99	1.06	0.2	0.47	0.46	0.61	0.82	0.66
Thorium-234 (pCi/g)									
Uranium-235 (pCi/g)	0.2	0.16	0.17	0.23	0.19	0.15	0.24	0.34	0.62
Uranium-238 (pCi/g)	1.76 U	2.1 U	0.57 U	0.26 U	2.3 U	1.02 U	2.73	1.24 U	2.49 U

Station	**IAC-BH0105**	**IAC-BH0116**	**IAC-BH0116**	**IAC-BH0117**	**IAC-BH0118**	**IAC-BH0119**	**IAC-BH0120**	**IAC-MSC0001**	**IAC-MSC0002**
Sample No	**PNV0576**	**PNV0674**	**PNV0765**	**PNV0675**	**PNV0773**	**PNV0676**	**PNV0776**	**PNV0001**	**112INV001**
Collection Date	**10/08/96**	**10/14/96**	**10/14/96**	**10/14/96**	**10/11/96**	**10/14/96**	**10/11/96**	**07/25/96**	**06/27/96**
Depth (ft)	**3.5-4.5**	**0.5-1.5**	**0.0-0.5**	**0.5-1.5**	**0.0-0.5**	**0.5-1.5**	**0.0-0.5**	**1.0-1.5**	**0.0-0.5**
Duplicate ID									
Northing	**232780**	**232801**	**232801**	**232780**	**232780**	**232756**	**232756**	**232753**	**232800**
Easting	**705253**	**705256**	**705256**	**705271**	**705273**	**705271**	**705273**	**705247**	**705277**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Radium-226 (pCi/g)		25.9 J		0.78		2.07			
Thorium-227 (pCi/g)		3.6		0.37 U		0.36 UJ			
Thorium-228 (pCi/g)	1.35	43.68 J		1.38	0.9	1.61 J	0.27	1.57	
Thorium-230 (pCi/g)	1.49	24.78		1.56	1.77	2.41 J	1.03	5.15	
Thorium-232 (pCi/g)	1.53	0.74		0.56	0.92	1.07 J	0.46	0.95	
Uranium-233/234 (pCi/g)									
Uranium-234 (pCi/g)		49.24		1.96		2.58			
Uranium-235 (pCi/g)		3.01 J		0.1 UJ		0.2 J			
Uranium-238 (pCi/g)		50.44		2.32		2.28			
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	0.62 U	3.2 UJ	1.48	0.81 UJ	0.49 U	1.5 UJ	0.32 U	0.94	
Actinium-228 (pCi/g)						0.9 J			
Americium-241 (pCi/g)	0.25 U	0.91 UJ	0.78 U	0.14 UJ	0.2 U	0.27 UJ	0.15 U	0.43 U	
Bismuth-212 (pCi/g)									
Bismuth-214 (pCi/g)		71.1		0.81		1.9			
Cadmium-109 (pCi/g)		66.1				0.42 UJ			
Cesium-137 (pCi/g)	0.06 U		0.2		0.05 U		0.07	0.09 U	
Cobalt-60 (pCi/g)									
Europium-155 (pCi/g)									
Lead-210 (pCi/g)		54.8		0.53 UJ					
Lead-212 (pCi/g)				0.36		0.61			
Lead-214 (pCi/g)		71.1		0.81		1.9			
Neodymium-147 (pCi/g)		2.8 J		0.05 UJ					
Niobium-95 (pCi/g)		2.8							
Potassium-40 (pCi/g)	25.22	9.3	8.21	4.5	13.3	12.4	5.23	9.61	
Protactinium-231 (pCi/g)	1.77 U	14.7 UJ	5.06 U	3.6 UJ	1.48 U	5.5 UJ	1.09 U	2.83 U	
Protactinium-234 (pCi/g)									
Protactinium-234m (pCi/g)									
Radium-224 (pCi/g)				0.35 J		0.6 J			
Radium-226 (pCi/g)	1.07	71.1	27.37	0.81	1.19	1.9	1.01	17.58	0.46
Radium-228 (pCi/g)	1.3	1.4 UJ	0.48	0.44 UJ	0.95	0.9	0.39	0.48	
Thallium-208 (pCi/g)									
Thorium-228 (pCi/g)	1.3	1.4 UJ	0.48	0.44 UJ	0.95	0.9	0.39	0.42	
Thorium-230 (pCi/g)	19.9 U		64.4 U		17.3 U		12.2 U		

Station	IAC-BH0105	IAC-BH0116	IAC-BH0116	IAC-BH0117	IAC-BH0118	IAC-BH0119	IAC-BH0120	IAC-MSC0001	IAC-MSC0002
Sample No	**PNV0576**	**PNV0674**	**PNV0765**	**PNV0675**	**PNV0773**	**PNV0676**	**PNV0776**	**PNV0001**	**112INV001**
Collection Date	**10/08/96**	**10/14/96**	**10/14/96**	**10/14/96**	**10/11/96**	**10/14/96**	**10/11/96**	**07/25/96**	**06/27/96**
Depth (ft)	**3.5-4.5**	**0.5-1.5**	**0.0-0.5**	**0.5-1.5**	**0.0-0.5**	**0.5-1.5**	**0.0-0.5**	**1.0-1.5**	**0.0-0.5**
Duplicate ID									
Northing	**232780**	**232801**	**232801**	**232780**	**232780**	**232756**	**232756**	**232753**	**232800**
Easting	**705253**	**705256**	**705256**	**705271**	**705273**	**705271**	**705273**	**705247**	**705277**
Thorium-232 (pCi/g)	1.3	1.4 UJ	0.48	0.44 UJ	0.95	0.9	0.39	0.48	0.26 U
Thorium-234 (pCi/g)		15.3		-0.37 UJ					
Uranium-235 (pCi/g)	0.13	8.2 J	3.11	0.16 J	0.19	0.31 J	0.13	1.29	
Uranium-238 (pCi/g)	1.86 U	15.3	6.81 U	-0.37 UJ	0.24 U	2.8 UJ	1.53 U	4.93	0.3 U

Station	IAC-MSC0003	IAC-MSC0004	IAC-MSC0005	IAC-SB0001	IAC-SB0002	IAC-SB0003	IAC-SB0004	IAC-SB0005	IAC-SB0006
Sample No	**112INV002**	**112INV003**	**112INV004**	**PVSB0109**	**PVSB0112**	**PVSB0110**	**PVSB0113**	**PVSB0111**	**PVSB0224**
Collection Date	**06/27/96**	**06/27/96**	**06/27/96**	**09/13/00**	**09/13/00**	**09/14/00**	**09/14/00**	**09/14/00**	**09/20/00**
Depth (ft)	**0.0-0.5**	**0.0-0.5**	**0.0-0.5**	**0.5-1.5**	**2.0-2.7**	**0.0-0.5**	**0.0-0.7**	**0.0-0.5**	**1.0-1.6**
Duplicate ID									
Northing	**232802**	**232806**	**232804**	**232763**	**232776**	**232765**	**232749**	**232736**	**232735**
Easting	**705277**	**705283**	**705283**	**705273**	**705273**	**705271**	**705271**	**705272**	**705274**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Radium-226 (pCi/g)									
Thorium-227 (pCi/g)									
Thorium-228 (pCi/g)				1	1.27	9.37 U	1.3 J	1.59 J	0.45 U
Thorium-230 (pCi/g)				2.11	1.35	311.8	11.77	10.1	3
Thorium-232 (pCi/g)				1.04	1.28	3.55 U	2.18	3 J	0.26 U
Uranium-233/234 (pCi/g)				1.87	2.07	381.8	11.19	12.84	1.2
Uranium-234 (pCi/g)									
Uranium-235 (pCi/g)				0.09 U	0.09 U	42.22 J	0.75 U	1.75 J	0.11 U
Uranium-238 (pCi/g)				1.56 J	1.34 J	320.2	11.51	11.53	1.87
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)									
Actinium-228 (pCi/g)				2.29	0.81	1.72 J	0.8 J	0.12 U	0.35 J
Americium-241 (pCi/g)									
Bismuth-212 (pCi/g)				1.59 J	0.54 J	2.57 J	0.33 U	0.46 U	0.06 U
Bismuth-214 (pCi/g)				1.5	0.87	282.7	24.91	30.02	0.72
Cadmium-109 (pCi/g)									
Cesium-137 (pCi/g)				0.07 U	0.07 U	0.28 J	0.18 J	0.42	0.09 J
Cobalt-60 (pCi/g)				0.01 U	-0.02 U	-0.06 U	-0.01 U	0.02 U	0.01 U
Europium-155 (pCi/g)									
Lead-210 (pCi/g)									
Lead-212 (pCi/g)				2.56	1.03	0.64 U	0.25 U	0.72	0.45
Lead-214 (pCi/g)				2.32	0.97	287.4 U	24.77	31	0.95
Neodymium-147 (pCi/g)									
Niobium-95 (pCi/g)									
Potassium-40 (pCi/g)									
Protactinium-231 (pCi/g)									
Protactinium-234 (pCi/g)				-12.16 U	-4.44 U	150.9	5.88 U	7.94 U	0.82 U
Protactinium-234m (pCi/g)									
Radium-224 (pCi/g)									
Radium-226 (pCi/g)	0.83	0.75	0.85	2.03	0.95	285.05 J	24.84	30.51	0.83
Radium-228 (pCi/g)									
Thallium-208 (pCi/g)				1.29	0.87	1.82 J	0.49 J	0.36 J	0.34 J
Thorium-228 (pCi/g)									
Thorium-230 (pCi/g)									

Station	IAC-MSC0003	IAC-MSC0004	IAC-MSC0005	IAC-SB0001	IAC-SB0002	IAC-SB0003	IAC-SB0004	IAC-SB0005	IAC-SB0006
Sample No	**112INV002**	**112INV003**	**112INV004**	**PVSB0109**	**PVSB0112**	**PVSB0110**	**PVSB0113**	**PVSB0111**	**PVSB0224**
Collection Date	**06/27/96**	**06/27/96**	**06/27/96**	**09/13/00**	**09/13/00**	**09/14/00**	**09/14/00**	**09/14/00**	**09/20/00**
Depth (ft)	**0.0-0.5**	**0.0-0.5**	**0.0-0.5**	**0.5-1.5**	**2.0-2.7**	**0.0-0.5**	**0.0-0.7**	**0.0-0.5**	**1.0-1.6**
Duplicate ID									
Northing	**232802**	**232806**	**232804**	**232763**	**232776**	**232765**	**232749**	**232736**	**232735**
Easting	**705277**	**705283**	**705283**	**705273**	**705273**	**705271**	**705271**	**705272**	**705274**
Thorium-232 (pCi/g)	0.59	0.51	0.97						
Thorium-234 (pCi/g)				0.35 U	2.58	97.02	5.93 J	5.75 J	1.16 J
Uranium-235 (pCi/g)									
Uranium-238 (pCi/g)	0.9 U	2.98	0.18 U						

Station	IAC-SB0007	IAC-SB0008	IAC-SB0009
Sample No	**PVSB0227**	**PVSB0230**	**PVSB0233**
Collection Date	**09/20/00**	**09/21/00**	**09/21/00**
Depth (ft)	**0.5-1.3**	**1.0-1.5**	**1.5-2.5**
Duplicate ID			
Northing	**232743**	**232750**	**232790**
Easting	**705273**	**705274**	**705273**
Radiological Parameters			
Radiological Parameters (AlphaSpec)			
Radium-226 (pCi/g)			
Thorium-227 (pCi/g)			
Thorium-228 (pCi/g)	1.07 J	1.55 J	1.45
Thorium-230 (pCi/g)	4.21	4.95	3.04
Thorium-232 (pCi/g)	1.43	2.32 J	1.09
Uranium-233/234 (pCi/g)	1.83	4.38	1.9
Uranium-234 (pCi/g)			
Uranium-235 (pCi/g)	0.3 J	0.74 J	0.07 U
Uranium-238 (pCi/g)	1.72	4.17	1.63
Radiological Parameters (GammaSpec)			
Actinium-227 (pCi/g)			
Actinium-228 (pCi/g)	0.49	0.92	0.8
Americium-241 (pCi/g)			
Bismuth-212 (pCi/g)	0.44 J	0.73 J	0.25 U
Bismuth-214 (pCi/g)	1.45	2.6	1.23
Cadmium-109 (pCi/g)			
Cesium-137 (pCi/g)	-0.01 U	0.2 J	-0.01 U
Cobalt-60 (pCi/g)	0.02 U	0.02 U	0.06 U
Europium-155 (pCi/g)			
Lead-210 (pCi/g)			
Lead-212 (pCi/g)	0.66	1.12	0.99
Lead-214 (pCi/g)	1.43	2.77	0.92
Neodymium-147 (pCi/g)			
Niobium-95 (pCi/g)			
Potassium-40 (pCi/g)			
Protactinium-231 (pCi/g)			
Protactinium-234 (pCi/g)	2.65 U	0.73 U	1.78 U
Protactinium-234m (pCi/g)			
Radium-224 (pCi/g)			
Radium-226 (pCi/g)	1.44	2.69	1.07
Radium-228 (pCi/g)			
Thallium-208 (pCi/g)	0.36 J	0.96	0.62
Thorium-228 (pCi/g)			
Thorium-230 (pCi/g)			

Station	**IAC-SB0007**	**IAC-SB0008**	**IAC-SB0009**
Sample No	**PVSB0227**	**PVSB0230**	**PVSB0233**
Collection Date	**09/20/00**	**09/21/00**	**09/21/00**
Depth (ft)	**0.5-1.3**	**1.0-1.5**	**1.5-2.5**
Duplicate ID			
Northing	**232743**	**232750**	**232790**
Easting	**705273**	**705274**	**705273**
Thorium-232 (pCi/g)			
Thorium-234 (pCi/g)	1.19 J	2.55 J	1.06 U
Uranium-235 (pCi/g)			
Uranium-238 (pCi/g)			

Station	IAD-BH0061	IAD-BH0061	IAD-BH0061	IAD-BH0061	IAD-BH0061	IAD-BH0062	IAD-BH0062	IAD-BH0063	IAD-BH0063
Sample No	**PNV0326**	**PNV0327**	**PNV0328**	**PNV0329**	**PNV0330**	**PNV0331**	**PNV0334**	**PNV0336**	**PNV0337**
Collection Date	**09/03/96**	**09/04/96**	**09/04/96**	**09/04/96**	**09/04/96**	**09/03/96**	**09/03/96**	**09/05/96**	**09/05/96**
Depth (ft)	**0.0-0.5**	**1.2-1.5**	**1.5-2.5**	**2.5-3.5**	**3.5-4.5**	**0.0-0.5**	**2.5-3.5**	**0.0-0.5**	**0.5-1.5**
Duplicate ID									
Northing	**232719**	**232719**	**232719**	**232719**	**232719**	**232715**	**232715**	**232708**	**232708**
Easting	**705183**	**705183**	**705183**	**705183**	**705183**	**705193**	**705193**	**705213**	**705213**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Thorium-228 (pCi/g)	0.67				0.92	1.28	1.25		1.35
Thorium-230 (pCi/g)	1.79				1.58	15.45	1.71		2.12
Thorium-232 (pCi/g)	0.39				1.01	0.94	1.28		1.12
Uranium-233/234 (pCi/g)									
Uranium-235 (pCi/g)									
Uranium-238 (pCi/g)									
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	0.32 U	0.44 U	0.43 U	0.43 U	0.46 U	0.4	0.45 U	0.33	0.45 U
Actinium-228 (pCi/g)									
Americium-241 (pCi/g)	0.15 U	0.18 U	0.18 U	0.18 U	0.2 U	0.28 U	0.19 U	0.27 U	0.19 U
Bismuth-212 (pCi/g)									
Bismuth-214 (pCi/g)									
Cesium-137 (pCi/g)	0.05	0.04 U	0.05 U	0.04 U	0.05 U	0.73	0.04 U	0.08	0.04 U
Cobalt-60 (pCi/g)									
Lead-212 (pCi/g)									
Lead-214 (pCi/g)									
Potassium-40 (pCi/g)	8.94	12.28	12.8	11.94	14.75	9.31	13.66	11.99	11.25
Protactinium-231 (pCi/g)	1.09 U	1.32 U	1.31 U	1.33 U	1.4 U	1.99 U	1.31 U	1.89 U	1.39 U
Protactinium-234 (pCi/g)									
Radium-226 (pCi/g)	0.65	0.65	0.61	0.59	0.65	4.21	0.7	5.61	1.31
Radium-228 (pCi/g)	0.3	0.65	0.7	0.76	0.71	0.57	0.76	0.81	0.88
Thallium-208 (pCi/g)									
Thorium-228 (pCi/g)	0.3	0.65	0.7	0.76	0.71	0.57	0.76	0.81	0.88
Thorium-230 (pCi/g)	12.5 U	14.6 U	14.9 U	14.9 U	15.7 U	24.5 U	15.4 U	22.8 U	15.6 U
Thorium-232 (pCi/g)	0.3	0.65	0.7	0.76	0.71	0.57	0.76	0.81	0.88
Thorium-234 (pCi/g)									
Uranium-235 (pCi/g)	0.1	0.12	0.11	0.08 U	0.09	0.75	0.14	0.71	0.15
Uranium-238 (pCi/g)	0.9 U	2.17 U	1.18 U	0.27 U	-0.28 U	1.41 U	1.59 U	3.25 U	2.94

IAD Soil Radiological Data

Station	IAD-BH0064	IAD-BH0067	IAD-BH0067	IAD-BH0072	IAD-BH0088	IAD-BH0088	IAD-BH0127	IAD-SB0001	IAD-SB0002
Sample No	**PNV0341**	**PNV0356**	**PNV0357**	**PNV0386**	**PNV0474**	**PNV0475**	**PNV0711**	**PVSB0200**	**PVSB0203**
Collection Date	**09/04/96**	**09/04/96**	**09/04/96**	**09/04/96**	**09/18/96**	**09/18/96**	**10/15/96**	**09/19/00**	**09/19/00**
Depth (ft)	**0.0-0.5**	**0.0-0.5**	**0.5-0.8**	**0.0-0.5**	**0.0-0.5**	**0.5-1.5**	**3.5-4.5**	**0.0-1.0**	**0.0-1.0**
Duplicate ID									
Northing	**232707**	**232699**	**232699**	**232700**	**232688**	**232688**	**232699**	**232707**	**232702**
Easting	**705223**	**705222**	**705222**	**705215**	**705222**	**705222**	**705185**	**705198**	**705198**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Thorium-228 (pCi/g)	0.69	1.18	1.11	0.48	1.03	1.68	0.76	2.05 J	3.03
Thorium-230 (pCi/g)	2.88	4.83	6.89	1.68	4.01	3.54	1.6	20.7	19.8
Thorium-232 (pCi/g)	0.36	0.76	1.07	0.9	1.01	0.8	1.03	2.37 J	2.58
Uranium-233/234 (pCi/g)								5.53	3.54
Uranium-235 (pCi/g)								0.23 U	0.09 U
Uranium-238 (pCi/g)								4.14	3.61
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	0.4 U	0.56	0.5	0.38 U	0.41 U	0.45 U	0.55 U		
Actinium-228 (pCi/g)								0.67 J	0.57 J
Americium-241 (pCi/g)	0.21 U	0.28 U	0.29 U	0.18 U	0.19 U	0.21 U	0.21 U		
Bismuth-212 (pCi/g)								0.46 U	1.27 J
Bismuth-214 (pCi/g)								14.85	12.64
Cesium-137 (pCi/g)	0.19	0.17	0.12	0.18	0.25	0.03 U	0.06 U	0.01 U	0.14 J
Cobalt-60 (pCi/g)								-0.05 U	0.17 U
Lead-212 (pCi/g)								0.12 U	0.35 J
Lead-214 (pCi/g)								14.66	12.34
Potassium-40 (pCi/g)	4.62	6.25	5.6	7.41	4.8	4.92	16.81		
Protactinium-231 (pCi/g)	1.5 U	1.92 U	1.97 U	1.29 U	1.31 U	1.49 U	1.63 U		
Protactinium-234 (pCi/g)								7.71 U	-1.51 U
Radium-226 (pCi/g)	2.76	6.57	6.94	0.38	2.21	2.32	0.76	14.76	12.49
Radium-228 (pCi/g)	0.38	0.68	0.64	0.5	0.66	0.83	1.06		
Thallium-208 (pCi/g)								0.91	0.59 J
Thorium-228 (pCi/g)	0.38	0.68	0.64	0.5	0.66	0.83	1.06		
Thorium-230 (pCi/g)	17.4 U	23.7 U	24.2 U	14.9 U	15.8 U	17.1 U	17.8 U		
Thorium-232 (pCi/g)	0.38	0.68	0.64	0.5	0.66	0.83	1.06		
Thorium-234 (pCi/g)								1.4 U	2.69 U
Uranium-235 (pCi/g)	0.31	0.8	0.83	0.23	0.29	0.31	0.14		
Uranium-238 (pCi/g)	3.17 U	5.32	4.14 U	1.24 U	2.37	3.26 U	2.03 U		

Station	IAD-SB0003	IAD-SB0004
Sample No	**PVSB0212**	**PVSB0215**
Collection Date	**09/20/00**	**09/20/00**
Depth (ft)	**0.0-1.0**	**0.0-1.0**
Duplicate ID		
Northing	**232713**	**232703**
Easting	**705188**	**705229**
Radiological Parameters		
Radiological Parameters (AlphaSpec)		
Thorium-228 (pCi/g)	0.5 J	1.12 J
Thorium-230 (pCi/g)	6.13	7.06
Thorium-232 (pCi/g)	1.49	1.32
Uranium-233/234 (pCi/g)	2.33	2.54
Uranium-235 (pCi/g)	0.15 U	0.31 J
Uranium-238 (pCi/g)	2.13	3.05
Radiological Parameters (GammaSpec)		
Actinium-227 (pCi/g)		
Actinium-228 (pCi/g)	0.91	1.22
Americium-241 (pCi/g)		
Bismuth-212 (pCi/g)	0.76 J	1.07 J
Bismuth-214 (pCi/g)	4.31	2.67
Cesium-137 (pCi/g)	0.08 J	0.1 J
Cobalt-60 (pCi/g)	0.11 U	0.02 U
Lead-212 (pCi/g)	1.44	1.36
Lead-214 (pCi/g)	4.18	2.94
Potassium-40 (pCi/g)		
Protactinium-231 (pCi/g)		
Protactinium-234 (pCi/g)	6.74 U	4.86 U
Radium-226 (pCi/g)	4.24	2.8
Radium-228 (pCi/g)		
Thallium-208 (pCi/g)	0.73	0.94
Thorium-228 (pCi/g)		
Thorium-230 (pCi/g)		
Thorium-232 (pCi/g)		
Thorium-234 (pCi/g)	0.79 U	2.15 J
Uranium-235 (pCi/g)		
Uranium-238 (pCi/g)		

Station	**IAG-BH0021**	**IAG-BH0021**	**IAG-BH0021**	**IAG-BH0021**	**IAG-BH0022**	**IAG-BH0022**	**IAG-BH0023**	**IAG-BH0023**	**IAG-BH0023**
Sample No	**PNV0121**	**PNV0122**	**PNV0123**	**PNV0124**	**PNV0126**	**PNV0127**	**PNV0128**	**PNV0129**	**PNV0130**
Collection Date	**08/19/96**	**08/19/96**	**08/19/96**	**08/19/96**	**08/19/96**	**08/19/96**	**08/20/96**	**08/20/96**	**08/20/96**
Depth (ft)	**0.0-0.5**	**0.5-1.5**	**1.5-2.5**	**2.5-3.5**	**0.0-0.5**	**0.5-1.0**	**0.0-0.5**	**0.5-1.0**	**1.5-2.5**
Duplicate ID									
Northing	**232887**	**232887**	**232887**	**232887**	**232898**	**232898**	**232878**	**232878**	**232878**
Easting	**705022**	**705022**	**705022**	**705022**	**705030**	**705030**	**705053**	**705053**	**705053**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Thorium-227 (pCi/g)									
Thorium-228 (pCi/g)	0.73	1.24	1.11	1.3	1.43	1.05		0.75	1.03
Thorium-230 (pCi/g)	1	1.45	2.28	1.66	2.89	3.15		5.95	1.66
Thorium-232 (pCi/g)	0.39	0.91	1.02	1.54	1.02	1.06		0.77	0.67
Uranium-233/234 (pCi/g)									
Uranium-234 (pCi/g)									
Uranium-235 (pCi/g)									
Uranium-238 (pCi/g)									
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	0.05 U	0.17 U	0.09 U	0.23	0.24 U	0.16 U	1.98	0.58	0.39 U
Actinium-228 (pCi/g)									
Americium-241 (pCi/g)	-0.01 U	-0.06 U	0.12 U	-0.01 U	0.04 U	0.09 U	0.53 U	0.39 U	0.17 U
Bismuth-212 (pCi/g)									
Bismuth-214 (pCi/g)									
Cesium-137 (pCi/g)	0.05	-0.02 U	0.03 U	0.03 U	0.28	0.22	0.37	0.04 U	0.04 U
Cobalt-60 (pCi/g)									
Lead-210 (pCi/g)									
Lead-212 (pCi/g)									
Lead-214 (pCi/g)									
Neodymium-147 (pCi/g)									
Potassium-40 (pCi/g)	2.98	9.05	16.89	19.07	8.33	7.02	8.47	9.39	14.87
Protactinium-231 (pCi/g)	0.22 U	0.17 U	0.05 U	-0.29 U	-0.13 U	0.19 U	3.53 U	2.68 U	1.29 U
Protactinium-234 (pCi/g)									
Radium-224 (pCi/g)									
Radium-226 (pCi/g)	0.49	1.22	0.92	0.96	2.18	2.29	22.4	7.74	0.99
Radium-228 (pCi/g)	0.47	1.19	0.94	1.18	1.14	1.09	0.57	0.98	0.64
Thallium-208 (pCi/g)									
Thorium-228 (pCi/g)	0.47	1.19	0.94	1.18	1.14	1.09	0.57	0.98	0.64
Thorium-230 (pCi/g)	-0.15 U	-1.05 U	-7.55 U	2.07 U	2.24 U	7.72 U	43.9 U	32.8 U	14.7 U
Thorium-232 (pCi/g)	0.47	1.19	0.94	1.18	1.14	1.09	0.57	0.98	0.64
Thorium-234 (pCi/g)									
Uranium-235 (pCi/g)	0.16 U	0.16 U	0.15 U	0.06 U	0.37	0.13 U	2.21	1.12	0.18
Uranium-238 (pCi/g)	0.51 U	1.22 U	0.45 U	0.77 U	2.8	2	10.28	12.12	2.04 U

Station	IAG-BH0023	IAG-BH0023	IAG-BH0024	IAG-BH0025	IAG-BH0026	IAG-BH0027	IAG-SB0001
Sample No	**PNV0132**	**PNV0133**	**PNV0146**	**PNV0145**	**PNV0149**	**PNV0154**	**PVSB0114**
Collection Date	**08/20/96**	**08/20/96**	**08/20/96**	**08/20/96**	**08/21/96**	**08/21/96**	**09/19/00**
Depth (ft)	**2.5-3.5**	**3.5-4.5**	**0.5-1.5**	**3.5-4.5**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**
Duplicate ID							
Northing	**232878**	**232878**	**232872**	**232877**	**232898**	**232908**	**232890**
Easting	**705053**	**705053**	**705053**	**705069**	**705036**	**705035**	**705035**
Radiological Parameters							
Radiological Parameters (AlphaSpec)							
Thorium-227 (pCi/g)			0.19				
Thorium-228 (pCi/g)	1.47	0.84	0.82	1.11	1.44	0.94	5.29
Thorium-230 (pCi/g)	2.13	0.97	2.61	1.82	3.48	1.71	13.5
Thorium-232 (pCi/g)	1.05	0.8	1.02	1.09	1.75	1.23	2.35
Uranium-233/234 (pCi/g)							3.71
Uranium-234 (pCi/g)			2.67 J				
Uranium-235 (pCi/g)			0.22 J				0.51
Uranium-238 (pCi/g)			3.91 J				3.9
Radiological Parameters (GammaSpec)							
Actinium-227 (pCi/g)	0.56 U	0.64 U	0.85 UJ	0.55 U	0.75 U	0.5 U	
Actinium-228 (pCi/g)			0.77				1.32
Americium-241 (pCi/g)	0.23 U	0.26 U	0.11 UJ	0.23 U	0.32 U	0.21 U	
Bismuth-212 (pCi/g)							0.77 J
Bismuth-214 (pCi/g)			2.2				2.11
Cesium-137 (pCi/g)	0.06 U	0.07 U		0.06 U	0.16	0.05 U	0.06 J
Cobalt-60 (pCi/g)							-0.01 U
Lead-210 (pCi/g)			1.2				
Lead-212 (pCi/g)			0.6				2.92
Lead-214 (pCi/g)			2.2				2.19
Neodymium-147 (pCi/g)			0.73				
Potassium-40 (pCi/g)	23.99	24.15	3.8	23.68	11.82	18.88	
Protactinium-231 (pCi/g)	1.73 U	1.92 U	3.6 UJ	1.63 U	2.3 U	1.48 U	
Protactinium-234 (pCi/g)							1.59 U
Radium-224 (pCi/g)			0.59				
Radium-226 (pCi/g)	1.22	1.15	2.2	0.96	2.14	1.03	2.15
Radium-228 (pCi/g)	1.09	1.27	0.77	1.04	1.17	1.02	
Thallium-208 (pCi/g)							1.09
Thorium-228 (pCi/g)	1.09	1.27	0.77	1.04	1.17	1.02	
Thorium-230 (pCi/g)	19.3 U	20.8 U		18.6 U	25.6 U	16.9 U	
Thorium-232 (pCi/g)	1.09	1.27	0.77	1.04	1.17	1.02	
Thorium-234 (pCi/g)			0.76 UJ				1.36 J
Uranium-235 (pCi/g)	0.2	0.19	0.2 J	0.18	0.33	0.15	
Uranium-238 (pCi/g)	1.56 U	3.97 U	0.76 UJ	2.16 U	2.15 U	0.09 U	

IAI Soil Radiological Data

Station	**IAI-BH0001**	**IAI-BH0001**	**IAI-BH0001**	**IAI-BH0001**	**IAI-BH0002**	**IAI-BH0002**	**IAI-BH0046**	**IAI-BH0047**	**IAI-BH0047**
Sample No	**PNV0599**	**PNV0611**	**PNV0612**	**PNV0661**	**PNV0598**	**PNV0638**	**PNV0249**	**PNV0253**	**PNV0255**
Collection Date	**10/02/96**	**10/02/96**	**10/02/96**	**10/02/96**	**10/02/96**	**10/02/96**	**09/03/96**	**08/29/96**	**08/29/96**
Depth (ft)	**0.0-1.0**	**9.5-10.5**	**10.5-11.0**	**26.5-27.5**	**13.5-14.5**	**16.5-17.5**	**0.5-0.8**	**0.0-0.5**	**1.5-2.5**
Duplicate ID									
Northing	**232940**	**232940**	**232940**	**232940**	**232923**	**232923**	**232947**	**232941**	**232941**
Easting	**704816**	**704816**	**704816**	**704816**	**704811**	**704811**	**704819**	**704816**	**704816**
Radiological Parameters									
Radiological Parameters (AlphaSpec)									
Radium-226 (pCi/g)	32.53				0.24				
Thorium-227 (pCi/g)	6.04 J				0.95 J				
Thorium-228 (pCi/g)	1.75 J	0.96	1.12	1.97	1.54	1.66	1.03		1.12
Thorium-230 (pCi/g)	304.2 J	4.37	2.18	1.47	1.46	1.78	1.54		5.64
Thorium-232 (pCi/g)	2.11 J	0.66	1.05	1.28	1.12	1.13	0.99		0.89
Uranium-234 (pCi/g)	20.47 J				1.26				
Uranium-235 (pCi/g)	4.73 J				0.21				
Uranium-238 (pCi/g)	18.29 J				1.51				
Radiological Parameters (GammaSpec)									
Actinium-227 (pCi/g)	3.2 UJ	0.78 U	0.7 U	0.6 U	1.2 U	0.51 U	0.5 U	2.91	0.75
Actinium-228 (pCi/g)					1.2				
Americium-241 (pCi/g)	0.91 UJ	0.35 U	0.33 U	0.24 U	0.19 U	0.21 U	0.2 U	0.47	0.04 U
Bismuth-214 (pCi/g)									
Cadmium-109 (pCi/g)	6.1 UJ				1.8 U				
Cesium-137 (pCi/g)		0.06 U	0.07	0.06 U		0.05 U	0.25	0.14	0.02 U
Europium-155 (pCi/g)	7.1 J				0.21 U				
Iodine-133 (pCi/g)	-7.5 UJ								
Lead-210 (pCi/g)	74 J				0.21 U				
Lead-212 (pCi/g)					1 U				
Lead-214 (pCi/g)									
Neodymium-147 (pCi/g)	3.5 J				0.34 U				
Niobium-95 (pCi/g)									
Niobium-95m (pCi/g)	7.3 J								
Potassium-40 (pCi/g)	16.1	5.6	6.08	23.21	20.9	21.36	21.01	16.13	13.11
Protactinium-231 (pCi/g)	18.8 UJ	2.7 U	2.34 U	1.81 U	4.2 U	1.44 U	1.45 U	1.75 U	1.08 U
Radium-224 (pCi/g)					0.98				
Radium-226 (pCi/g)	87.5	2.51	2.77	1.04	0.98	0.9	1.06	40.23	7.93
Radium-228 (pCi/g)	1.8 UJ	0.87	0.86	1.11	1.2	1.05	1.07	1.02	0.89
Thorium-228 (pCi/g)	1.8 UJ	0.87	0.86	1.11	1.1	1.05	1.07	1.02	0.89
Thorium-230 (pCi/g)		29 U	26.2 U	19.5 U		16.8 U	3.72 U	1.79 U	4.39 U
Thorium-232 (pCi/g)	1.8 UJ	0.87	0.86	1.11	1.2	1.05	1.07	1.02	0.89
Thorium-234 (pCi/g)	22.2				0.64 UJ				
Uranium-235 (pCi/g)	6.9 J	0.42	0.38	0.11	0.26	0.19	0.14	2.55	1.19
Uranium-238 (pCi/g)	22.2	4.49 U	1.66 U	2 U	0.88 U	1.92 U	2.1 U	13.18	9.7

Station	IAI-BH0047	IAI-BH0047	IAI-BH0047	IAI-BH0048	IAI-BH0102
Sample No	**PNV0256**	**PNV0257**	**PNV0384**	**PNV0259**	**PNV0560**
Collection Date	**08/29/96**	**08/29/96**	**08/29/96**	**09/03/96**	**09/24/96**
Depth (ft)	**2.5-3.5**	**3.5-4.5**	**0.5-1.5**	**0.5-1.5**	**1.5-2.5**
Duplicate ID					
Northing	**232941**	**232941**	**232941**	**232940**	**232961**
Easting	**704816**	**704816**	**704816**	**704809**	**704808**
Radiological Parameters					
Radiological Parameters (AlphaSpec)					
Radium-226 (pCi/g)					
Thorium-227 (pCi/g)			6.99		
Thorium-228 (pCi/g)			2.18	1.33	1.36
Thorium-230 (pCi/g)			38.77	1.72	2.86
Thorium-232 (pCi/g)			2.1	1.27	1.6
Uranium-234 (pCi/g)			43.93		
Uranium-235 (pCi/g)			2.91 J		
Uranium-238 (pCi/g)			44.56		
Radiological Parameters (GammaSpec)					
Actinium-227 (pCi/g)	0.28	0.1 U	4.44 UJ	0.53 U	0.52 U
Actinium-228 (pCi/g)					
Americium-241 (pCi/g)	0.05 U	0.03 U	1.21 UJ	0.22 U	0.1 U
Bismuth-214 (pCi/g)			125.11		
Cadmium-109 (pCi/g)			100.7 J		
Cesium-137 (pCi/g)	0.06	0.03 U		0.05 U	0.04 U
Europium-155 (pCi/g)					
Iodine-133 (pCi/g)					
Lead-210 (pCi/g)			76.86 J		
Lead-212 (pCi/g)					
Lead-214 (pCi/g)			125.11		
Neodymium-147 (pCi/g)			6.19 J		
Niobium-95 (pCi/g)			11.19 J		
Niobium-95m (pCi/g)					
Potassium-40 (pCi/g)	4.82	11.01	12.46 J	25.32	13.27
Protactinium-231 (pCi/g)	-0.01 U	0.12 U	20.7 UJ	1.6 U	1.74 U
Radium-224 (pCi/g)					
Radium-226 (pCi/g)	2.6	1.9	125.11	1.16	3.06
Radium-228 (pCi/g)	0.43	0.86	1.97 UJ	1.18	0.81
Thorium-228 (pCi/g)	0.43	0.86	1.97 UJ	1.18	0.81
Thorium-230 (pCi/g)	6.19 U	-5.26 U		18.3 U	20 U
Thorium-232 (pCi/g)	0.43	0.86	1.97 UJ	1.18	0.81
Thorium-234 (pCi/g)			25.38 J		
Uranium-235 (pCi/g)	0.62	0.43	10.71	0.17	0.38
Uranium-238 (pCi/g)	6.8	6.25	25.38	1.36 U	1.03 U

Station	IAP1B-SB0001	IAP1B-SB0002	IAP1B-SB0003	IAP1B-SB0004	IAP1B-SB0004	IAP1B-SB0005	IAP1B-SB0005
Sample No	**PVSB0115**	**PVSB0116**	**PVSB0121**	**PVSB0124**	**PVSB0124D**	**PVSB0127**	**PVSB0127D**
Collection Date	**09/06/00**	**09/06/00**	**09/06/00**	**09/06/00**	**09/06/00**	**09/07/00**	**09/07/00**
Depth (ft)	**0.2-1.2**	**0.0-1.5**	**0.6-1.8**	**1.0-3.0**	**1.0-3.0**	**1.0-2.5**	**1.0-2.5**
Duplicate ID					**PVSB9000**		**PVSB9001**
Northing	**232756**	**232738**	**232761**	**232782**	**232782**	**232773**	**232773**
Easting	**705171**	**705180**	**705188**	**705191**	**705191**	**705191**	**705191**
Radiological Parameters							
Radiological Parameters (AlphaSpec)							
Thorium-228 (pCi/g)	1.57	1.07	0.82	0.95	0.93	0.9	1.04
Thorium-230 (pCi/g)	1.56	1.28	1.27	1.51	1.25	1.13	1.59
Thorium-232 (pCi/g)	1.01	0.72	0.93	1.21	0.91	0.9	0.8
Uranium-233/234 (pCi/g)	1.3	1.21	1.04	1.82	1.57	1.08	1.29
Uranium-235 (pCi/g)	0.16 J	-0.02 U	0.11 U	0.05 U	0.18 J	0.19 U	0.19 J
Uranium-238 (pCi/g)	1.27	1.61	1.31	1.72	1.72	0.98	0.8
Radiological Parameters (GammaSpec)							
Actinium-228 (pCi/g)	1.4	0.7	0.74	1.06	0.76	0.8	1.13
Bismuth-212 (pCi/g)	0.54 J	0.82 J	0.61 J	0.93 J	0.72 J	1.1 J	0.58 J
Bismuth-214 (pCi/g)	1.02	0.79	0.84	1	1	0.85	0.99
Cesium-137 (pCi/g)	0.05 U	0.04 J	0.07 U	0.01 U	-0.01 U	0.04 U	0.11 U
Cobalt-60 (pCi/g)	-0.04 U	0.02 U	0.02 U	-0.02 U	-0.02 U	-0.01 U	0.12 U
Lead-212 (pCi/g)	1.26	0.81	0.87 U	1.16 U	1.03	1.59	1.33
Lead-214 (pCi/g)	1.06	0.58	0.66 U	0.79 U	1.09	1.12	0.94
Potassium-40 (pCi/g)	17.47	12.01	11.54	15.22	15.56	17.03	17.34
Protactinium-234 (pCi/g)	1.6 U	-2.35 U	1.5 U	2.37 U	0.66 U	0.27 U	5.67 U
Radium-226 (pCi/g)	1.04	0.69	0.75 J	0.9 J	0.83 J	0.98	0.96
Thallium-208 (pCi/g)	0.99	0.53	0.8	0.9	0.82	0.86	0.72
Thorium-234 (pCi/g)	2.81 J	1.13 J	1.95 J	1.96 J	1.56 J	1.29 J	0.79 U

Station	**IAP1B-SB0006**	**IAP1B-SB0007**	**IAP1B-SB0008**	**IAP1B-SB0009**	**IAP1B-SB0010**	**IAP1B-SB0011**	**IAP1B-SB0012**
Sample No	**PVSB0130**	**PVSB0133**	**PVSB0136**	**PVSB0139**	**PVSB0142**	**PVSB0145**	**PVSB0148**
Collection Date	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/08/00**
Depth (ft)	**1.5-2.5**	**0.5-1.5**	**1.0-2.0**	**1.1-2.1**	**1.0-1.8**	**0.8-1.8**	**3.5-5.5**
Duplicate ID							
Northing	**232768**	**232803**	**232774**	**232752**	**232783**	**232791**	**232791**
Easting	**705230**	**705188**	**705229**	**705231**	**705145**	**705162**	**705134**
Radiological Parameters							
Radiological Parameters (AlphaSpec)							
Thorium-228 (pCi/g)	0.96	1.03	1	0.78	0.87	0.89	1.07
Thorium-230 (pCi/g)	1.75	1.21	1.46	1.03	1.32	1.09	1.38
Thorium-232 (pCi/g)	1.07	0.87	1.11	0.66	1.19	0.82	1.1
Uranium-233/234 (pCi/g)	1.77	1.1	1.62	1.36	1.37	1.37	1.12
Uranium-235 (pCi/g)	0.18 J	0.08 U	0.07 U	0.05 U	0.03 U	0.08 U	0.08 U
Uranium-238 (pCi/g)	2.17	1.23	1.24	1.6	0.95	1.51	0.96
Radiological Parameters (GammaSpec)							
Actinium-228 (pCi/g)	0.99	0.82	1.48	1.16	0.79	0.98	0.91
Bismuth-212 (pCi/g)	0.72 J	0.77 J	1.07 U	0.2 U	0.58 U	0.44 U	0.74 J
Bismuth-214 (pCi/g)	1.48	0.81	1.97	1.39	0.67	0.92	1.09
Cesium-137 (pCi/g)	-0.07 U	0.02 U	0.14 U	0.07 U	0.02 U	0.07 U	0.08 U
Cobalt-60 (pCi/g)	0.01 U	0.01 U	0.01 U		-0.01 U	0.06 U	-0.02 U
Lead-212 (pCi/g)	1.39 U	0.95	1.56	1.01 U	0.75 U	1.23	1.08
Lead-214 (pCi/g)	1.28 U	0.96	2.03	1.15 U	0.78 U	1.1	0.96
Potassium-40 (pCi/g)	14.64	14.67	25.3	16.47	11.43	17.93	14.5
Protactinium-234 (pCi/g)	3.61 U	-1.42 U	2.07 U	0.16 U	0.95 U	1.69 U	4.33 U
Radium-226 (pCi/g)	1.38 J	0.88	2	1.27 J	0.72 J	1.01	1.03
Thallium-208 (pCi/g)	0.95	0.87	1.2	1.15	0.49	1.01	0.73
Thorium-234 (pCi/g)	2.32 J	1.47 J	2.22 J	0.79 U	0.12 U	3.34	2.25 J

Station	IAP1B-SB0013	IAP1B-SB0014	IAP1B-SB0015	IAP1B-SB0016
Sample No	**PVSB0151**	**PVSB0154**	**PVSB0157**	**PVSB0160**
Collection Date	**09/08/00**	**09/08/00**	**09/08/00**	**09/12/00**
Depth (ft)	**0.5-1.5**	**4.0-5.0**	**4.5-5.5**	**4.0-5.0**
Duplicate ID				
Northing	**232777**	**232818**	**232808**	**232764**
Easting	**705105**	**705104**	**705086**	**705245**
Radiological Parameters				
Radiological Parameters (AlphaSpec)				
Thorium-228 (pCi/g)	0.61	0.9	1.06	1.29
Thorium-230 (pCi/g)	1.57	1.47	1.34	3.73 J
Thorium-232 (pCi/g)	0.77	0.9	0.98	1.12
Uranium-233/234 (pCi/g)	1.26	1.77	1.6	3.5
Uranium-235 (pCi/g)	0.17 J	0.1 U	0.04 U	0.04 U
Uranium-238 (pCi/g)	1.57	1.9	1.72	2.99 J
Radiological Parameters (GammaSpec)				
Actinium-228 (pCi/g)	0.95	0.95	0.74	2.21
Bismuth-212 (pCi/g)	0.52 J	0.6 J	0.61 J	1.53 J
Bismuth-214 (pCi/g)	1.16	1.18	0.69	7.07
Cesium-137 (pCi/g)	0.07 J	0.06 J	0.02 U	0.26 J
Cobalt-60 (pCi/g)	-0.02 U	-0.01 U	-0.03 U	-0.13 U
Lead-212 (pCi/g)	0.97	1.04	0.92 U	2.31
Lead-214 (pCi/g)	1.12	1.6	0.79 U	7.78
Potassium-40 (pCi/g)	11.95	14.89	11.67	
Protactinium-234 (pCi/g)	-3.88 U	-0.68 U	1.66 U	11.9 U
Radium-226 (pCi/g)	1.14	1.39	0.74 J	7.42
Thallium-208 (pCi/g)	0.64	0.79	0.68	1.43
Thorium-234 (pCi/g)	3.91	1.6 J	0.09 U	5.6 J

Station	IARP-BH0065	IARP-BH0068	IARP-BH0069	IARP-BH0069	IARP-BH0070	IARP-BH0071	IARP-SB0001
Sample No	**PNV0350**	**PNV0365**	**PNV0367**	**PNV0370**	**PNV0371**	**PNV0380**	**PVSB0163**
Collection Date	**09/03/96**	**09/05/96**	**09/06/96**	**09/06/96**	**09/05/96**	**09/05/96**	**09/08/00**
Depth (ft)	**3.5-4.5**	**3.5-4.5**	**0.5-1.5**	**3.5-4.5**	**0.0-0.5**	**3.5-4.5**	**0.5-1.5**
Duplicate ID							
Northing	**232706**	**232707**	**232708**	**232708**	**232697**	**232688**	**232706**
Easting	**705233**	**705263**	**705273**	**705273**	**705263**	**705263**	**705248**
Radiological Parameters							
Radiological Parameters (AlphaSpec)							
Thorium-228 (pCi/g)	1.02	1.7	0.93	1.7	0.92	1.43	0.88
Thorium-230 (pCi/g)	1.22	2.33	1.51	1.45	3.41	2.19	10.31
Thorium-232 (pCi/g)	0.76	1.33	1.02	1.17	1.02	1.82	1.6
Uranium-233/234 (pCi/g)							2.57
Uranium-235 (pCi/g)							0.16 J
Uranium-238 (pCi/g)							2.48 J
Radiological Parameters (GammaSpec)							
Actinium-227 (pCi/g)	0.46 U	0.55 U	0.56 U	0.72 U	0.26 U	0.51 U	
Actinium-228 (pCi/g)							1.01 J
Americium-241 (pCi/g)	0.19 U	0.22 U	0.22 U	0.28 U	0.27 U	0.21 U	
Bismuth-212 (pCi/g)							1.67 J
Bismuth-214 (pCi/g)							5.34
Cesium-137 (pCi/g)	0.05 U	0.06 U	0.06 U	0.07 U	0.17	0.05 U	0.01 U
Cobalt-60 (pCi/g)							0.14 J
Lead-212 (pCi/g)							0.81
Lead-214 (pCi/g)							5.21
Potassium-40 (pCi/g)	13.39	21.82	17.56	25.37	16.14	19.34	
Protactinium-231 (pCi/g)	1.36 U	1.64 U	1.61 U	2.12 U	1.91 U	1.48 U	
Protactinium-234 (pCi/g)							8.72 U
Radium-226 (pCi/g)	0.64	0.93	0.93	1.15	4.06	0.93	5.28
Radium-228 (pCi/g)	0.75	1.17	1.07	1.36	0.85	1.01	
Thallium-208 (pCi/g)							0.94
Thorium-228 (pCi/g)	0.75	1.17	1.07	1.36	0.85	1.01	
Thorium-230 (pCi/g)	15.5 U	18.3 U	18.5 U	22.9 U	22.3 U	17 U	
Thorium-232 (pCi/g)	0.75	1.17	1.07	1.36	0.85	1.01	
Thorium-234 (pCi/g)							3.23 J
Uranium-235 (pCi/g)	0.11	0.17	0.11 U	0.21	0.38	0.09 U	
Uranium-238 (pCi/g)	1.25 U	0.36 U	1.93 U	2.2 U	2.16 U	0.47 U	

Station	IARP-SB0002	IARP-SB0003	IARP-SB0004	IARP-SB0005	IARP-SB0006	IARP-SB0007	IARP-SB0008
Sample No	**PVSB0166**	**PVSB0169**	**PVSB0172**	**PVSB0175**	**PVSB0178**	**PVSB0181**	**PVSB0184**
Collection Date	**09/11/00**	**09/11/00**	**09/11/00**	**09/11/00**	**09/11/00**	**09/11/00**	**09/11/00**
Depth (ft)	**1.5-2.5**	**1.3-2.3**	**2.0-2.9**	**0.5-1.5**	**1.5-2.6**	**1.0-2.0**	**1.3-2.3**
Duplicate ID							
Northing	**232700**	**232696**	**232690**	**232688**	**232691**	**232695**	**232717**
Easting	**705239**	**705235**	**705241**	**705256**	**705260**	**705263**	**705258**
Radiological Parameters							
Radiological Parameters (AlphaSpec)							
Thorium-228 (pCi/g)	0.81	1.17	1.27	1.12	1.14	1.2	1.23
Thorium-230 (pCi/g)	1.46	1.57	1.31	1.5	2.14	2.37 J	2.85 J
Thorium-232 (pCi/g)	0.9	0.97	1.08	1.41	1.2	1.08	1.26
Uranium-233/234 (pCi/g)	2.06	1.31	1.81	1.4	2.24	3.38	2.27
Uranium-235 (pCi/g)	0.14 U	0.11 U	0.08 U	0.08 U	0.22 J	0.51 J	0.24 U
Uranium-238 (pCi/g)	1.61 J	1.5 J	1.44 J	1.43 J	2.12 J	3.32 J	1.31 J
Radiological Parameters (GammaSpec)							
Actinium-227 (pCi/g)							
Actinium-228 (pCi/g)	1.38	0.85 J	0.78	1.46	1	0.93	1.22
Americium-241 (pCi/g)							
Bismuth-212 (pCi/g)	1.6 J	0.51 J	0.78 J	1.28 J	0.92 J	0.77 J	0.75 U
Bismuth-214 (pCi/g)	1.25	0.69	0.79	1.76	1.32	0.82	1.22
Cesium-137 (pCi/g)	0.05 U	-0.01 U	-0.02 U	0.08 U	0.09 J	0.08 J	0.02 U
Cobalt-60 (pCi/g)	-0.04 U	0.01 U	0.03 U	-0.01 U	-0.02 U	-0.02 U	0.03 U
Lead-212 (pCi/g)	1.35 U	1.07 U	0.99 U	1.53	1.25	1.1 U	1.97
Lead-214 (pCi/g)	0.87 U	0.95 U	0.59 U	1.39	1.48	0.61 U	1.09
Potassium-40 (pCi/g)							
Protactinium-231 (pCi/g)							
Protactinium-234 (pCi/g)	6.31 U	2.81 U	0.67 U	9.34 U	1.57 U	-0.66 U	1.89 U
Radium-226 (pCi/g)	1.06 J	0.82 J	0.69 J	1.57	1.4	0.71 J	1.16
Radium-228 (pCi/g)							
Thallium-208 (pCi/g)	1.31	0.84	0.83	1.53	0.95	0.81	0.84
Thorium-228 (pCi/g)							
Thorium-230 (pCi/g)							
Thorium-232 (pCi/g)							
Thorium-234 (pCi/g)	2.66 J	0.59 U	-0.09 U	1.6 U	2.58 J	3.07	2.66 J
Uranium-235 (pCi/g)							
Uranium-238 (pCi/g)							

Station	**IARP-SB0009**	**IARP-SB0010**	**IARP-SB0011**	**IARP-SB0012**	**IARP-SB0013**
Sample No	**PVSB0187**	**PVSB0190**	**PVSB0191**	**PVSB0192**	**PVSB0193**
Collection Date	**09/12/00**	**09/12/00**	**09/15/00**	**09/15/00**	**09/15/00**
Depth (ft)	**0.0-1.5**	**0.0-0.5**	**0.0-0.5**	**0.0-0.5**	**0.0-0.5**
Duplicate ID					
Northing	**232699**	**232692**	**232707**	**232697**	**232698**
Easting	**705267**	**705253**	**705262**	**705259**	**705261**
Radiological Parameters					
Radiological Parameters (AlphaSpec)					
Thorium-228 (pCi/g)	1.11	1.61	1.65 J	9.48 U	1.85 J
Thorium-230 (pCi/g)	2.86 J	2.13 J	14.41	79.04	10.59
Thorium-232 (pCi/g)	0.95	1.28	0.9 J	15.95 J	1.43 J
Uranium-233/234 (pCi/g)	4.71	2.78	9.39	21.23 J	11.14
Uranium-235 (pCi/g)	0.84 J	0.27 J	0.17 U	5.95 U	1.33 J
Uranium-238 (pCi/g)	2.69 J	1.99 J	9.31	21.96 J	7.76
Radiological Parameters (GammaSpec)					
Actinium-227 (pCi/g)					
Actinium-228 (pCi/g)	0.83	1.01 J	0.67 J	0.46 J	0.36 U
Americium-241 (pCi/g)					
Bismuth-212 (pCi/g)	0.7 J	0.1 U	0.8 J	-0.71 U	-0.11 U
Bismuth-214 (pCi/g)	2.84	0.82	31.82	75.94	18.87
Cesium-137 (pCi/g)	0.02 U	-0.01 U	0.16 J	0.28 J	0.07 U
Cobalt-60 (pCi/g)	0.02 U	-0.02 U	0.06 U	-0.01 U	0.03 U
Lead-212 (pCi/g)	2.27	1.06	0.94	0.85	0.77
Lead-214 (pCi/g)	2.98	0.93	30.99	75.62	17.96
Potassium-40 (pCi/g)					
Protactinium-231 (pCi/g)					
Protactinium-234 (pCi/g)	5.87 J	8.16 U	13.41 J	-4.68 U	8.3 U
Radium-226 (pCi/g)	2.91	0.88	31.41	75.78	18.42
Radium-228 (pCi/g)					
Thallium-208 (pCi/g)	0.83	0.71	0.25 J	0.43 J	0.41 J
Thorium-228 (pCi/g)					
Thorium-230 (pCi/g)					
Thorium-232 (pCi/g)					
Thorium-234 (pCi/g)	1.96 J	0.09 U	2.73 J	8.22	3.72 J
Uranium-235 (pCi/g)					
Uranium-238 (pCi/g)					

Station	**IAA-SB0002**	**IAA-SB0004**	**IAA-SB0004**	**IAA-SB0007**	**IAA-SB0007**	**IAA-SB0013**	**IAA-SB0015**	**IAA-SB0017**	**IAA-SB0023**	**IAA-SB0025**
Sample No	**PVSB0004**	**PVSB0010**	**PVSB0010D**	**PVSB0019**	**PVSB0236**	**PVSB0037**	**PVSB0043**	**PVSB0049**	**PVSB0067**	**PVSB0073**
Collection Date	**09/12/00**	**09/13/00**	**09/13/00**	**09/14/00**	**09/21/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/18/00**	**09/18/00**
Depth (ft)	**0.3-1.3**	**0.0-1.0**	**0.0-1.0**	**0.5-1.5**	**0.5-1.5**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**6.0-8.0**
Duplicate ID			**PVSB9002**							
Northing	**232874**	**232788**	**232788**	**232823**	**232823**	**232913**	**232824**	**232843**	**232892**	**232912**
Easting	**705005**	**704955**	**704955**	**704971**	**704971**	**704992**	**705003**	**705001**	**705004**	**704992**
Metals										
Aluminum (mg/kg)	10200	9580	11200	8040		8430	12700	8410	10200	10100
Antimony (mg/kg)	0.67	0.51	0.31	0.32		0.47	0.44	0.31	1.1	17
Arsenic (mg/kg)	17.5	13.9	13.4	17.7		7.8	13.9	7.8	15.3	40.3
Barium (mg/kg)	441	124	107	96.7		120	113	64.7	525	160
Beryllium (mg/kg)	0.76	0.57	0.57	0.59		0.54	0.72	0.46	1.3	0.71
Cadmium (mg/kg)	0.77	0.31	0.03	0.38		0.03 U	0.19	0.05	2.2	0.54
Calcium (mg/kg)	9640	7950	10000	9440		6910	11300	9290	30900	18200
Chromium (mg/kg)	50.8	52.7	28.1	57.9		29	36	21.4	110	75.7
Cobalt (mg/kg)	10.4	11	14.3	8.1		8.3	14.4	5.4	8.8	11.9
Copper (mg/kg)	70.7	486	73.2	63.7		30.2	56.1	16.8	222	260
Cyanide (mg/kg)	0.36 U	0.39 U		0.34 U		0.36 U	0.37 U	0.39 U		0.35 U
Iron (mg/kg)	40500	30600	31500	32000		34000	37500	18600	51500	40800
Lead (mg/kg)	122	192	37	22.4		15.4	55.5	20	134	134
Magnesium (mg/kg)	4180	4050	5450	2060		3930	6360	4430	6460	5350
Manganese (mg/kg)	418	461	461	487		472	375	164	854	745
Mercury (mg/kg)	0.26	0.2	0.2	0.03		0.09	0.05	0.06	0.21	0.11
Nickel (mg/kg)	39.2	32.7	36.3	18.6		20.6	38.2	14.2	39.9	104
Potassium (mg/kg)	1570	1700	1930	978		1530	1930	862	1050	1350
Selenium (mg/kg)	1	0.44 U	0.42 U	1.1		0.41 U	0.46 U	0.49 U	2.5	1
Silver (mg/kg)	0.12 U	0.11 U	0.11 U	0.1 U		0.11 U	0.12 U	0.13 U	0.12 U	0.11 U
Sodium (mg/kg)	137	109	89.4	138		109	122	68.1	315	175
Thallium (mg/kg)	0.4 U	0.37 U	0.35	1.2		0.34 U	0.38 U	0.41 U	0.42	0.5
Vanadium (mg/kg)	20.5	18.9	17.7	20.1		15.8	21.7	16	17.5	17.5
Zinc (mg/kg)	231	225	98.2	98.6		70.2	133	58.7	631	148
PCBs										
Aroclor-1016 (ug/kg)	400 U	36 U	36 U	36 U		360 U	800 U	40 U	790 U	370 U
Aroclor-1221 (ug/kg)	790 U	73 U	71 U	73 U		730 U	1600 U	80 U	1600 U	750 U
Aroclor-1232 (ug/kg)	400 U	36 U	36 U	36 U		360 U	800 U	40 U	790 U	370 U
Aroclor-1242 (ug/kg)	400 U	36 U	36 U	36 U		360 U	800 U	40 U	790 U	370 U
Aroclor-1248 (ug/kg)	400 U	36 U	36 U	36 U		360 U	800 U	40 U	790 U	370 U
Aroclor-1254 (ug/kg)	1200	82	49	36 U		1400	1600	49	3300	750
Aroclor-1260 (ug/kg)	400 U	36 U	36 U	36 U		360 U	800 U	40 U	790 U	370 U
Pesticides										
4,4'-DDD (ug/kg)	40 U	18 U	7.1 U	3.6 U		36 U	40 U	8 U	79 U	37 U

Station	**IAA-SB0002**	**IAA-SB0004**	**IAA-SB0004**	**IAA-SB0007**	**IAA-SB0007**	**IAA-SB0013**	**IAA-SB0015**	**IAA-SB0017**	**IAA-SB0023**	**IAA-SB0025**
Sample No	**PVSB0004**	**PVSB0010**	**PVSB0010D**	**PVSB0019**	**PVSB0236**	**PVSB0037**	**PVSB0043**	**PVSB0049**	**PVSB0067**	**PVSB0073**
Collection Date	**09/12/00**	**09/13/00**	**09/13/00**	**09/14/00**	**09/21/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/18/00**	**09/18/00**
Depth (ft)	**0.3-1.3**	**0.0-1.0**	**0.0-1.0**	**0.5-1.5**	**0.5-1.5**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**6.0-8.0**
Duplicate ID			**PVSB9002**							
Northing	**232874**	**232788**	**232788**	**232823**	**232823**	**232913**	**232824**	**232843**	**232892**	**232912**
Easting	**705005**	**704955**	**704955**	**704971**	**704971**	**704992**	**705003**	**705001**	**705004**	**704992**
4,4'-DDE (ug/kg)	40 U	18 U	7.1 U	3.6 U		36 U	40 U	8 U	79 U	37 U
4,4'-DDT (ug/kg)	120	18 U	7.1 U	3.6 U		85	91	8 U	250	70
Aldrin (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
Alpha-BHC (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
Beta-BHC (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
Decachlorobiphenyl (%)	0 D	74	73	71		0 D	0 D	58	0 D	0 D
Delta-BHC (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
Dieldrin (ug/kg)	63	18 U	7.1 U	3.6 U		36 U	40 U	8 U	79 U	37 U
Endosulfan I (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
Endosulfan II (ug/kg)	40 U	18 U	7.1 U	3.6 U		36 U	40 U	8 U	79 U	37 U
Endosulfan sulfate (ug/kg)	40 U	18 U	7.1 U	3.6 U		36 U	40 U	8 U	79 U	37 U
Endrin (ug/kg)	40 U	18 U	7.1 U	3.6 U		36 U	40 U	8 U	79 U	37 U
Endrin aldehyde (ug/kg)	40 U	18 U	7.1 U	3.6 U		36 U	40 U	8 U	79 U	37 U
Endrin ketone (ug/kg)	40 U	18 U	7.1 U	3.6 U		36 U	40 U	8 U	79 U	37 U
Heptachlor (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
Heptachlor epoxide (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
Methoxychlor (ug/kg)	200 U	91 U	36 U	18 U		180 U	200 U	40 U	400 U	190 U
Tetrachloro-m-xylene (%)	0 D	28	28	25 *		0 D	0 D	22 *	0 D	0 D
Toxaphene (ug/kg)	2000 U	910 U	360 U	180 U		1800 U	2000 U	400 U	4000 U	1900 U
alpha-Chlordane (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
gamma-BHC (Lindane) (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
gamma-Chlordane (ug/kg)	20 U	9.1 U	3.6 U	1.8 U		18 U	20 U	4 U	40 U	19 U
Semivolatile Organics										
1,2,4-Trichlorobenzene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
1,2-Dichlorobenzene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
1,3-Dichlorobenzene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
1,4-Dichlorobenzene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
2,2'-oxybis(1-Chloropropane) (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
2,4,5-Trichlorophenol (ug/kg)	4800 U	9100 U	9000 U	910 U		4600 U	9800 U	5100 U	10000 U	9300 U
2,4,6-Tribromophenol (%)	78	47	37	85		54	71	75	40	56
2,4,6-Trichlorophenol (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
2,4-Dichlorophenol (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
2,4-Dimethylphenol (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
2,4-Dinitrophenol (ug/kg)	4800 U	9100 U	9000 U	910 U		4600 U	9800 U	5100 U	10000 U	9300 U
2,4-Dinitrotoluene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U

Station	IAA-SB0002	IAA-SB0004	IAA-SB0004	IAA-SB0007	IAA-SB0007	IAA-SB0013	IAA-SB0015	IAA-SB0017	IAA-SB0023	IAA-SB0025
Sample No	**PVSB0004**	**PVSB0010**	**PVSB0010D**	**PVSB0019**	**PVSB0236**	**PVSB0037**	**PVSB0043**	**PVSB0049**	**PVSB0067**	**PVSB0073**
Collection Date	**09/12/00**	**09/13/00**	**09/13/00**	**09/14/00**	**09/21/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/18/00**	**09/18/00**
Depth (ft)	**0.3-1.3**	**0.0-1.0**	**0.0-1.0**	**0.5-1.5**	**0.5-1.5**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**6.0-8.0**
Duplicate ID			**PVSB9002**							
Northing	**232874**	**232788**	**232788**	**232823**	**232823**	**232913**	**232824**	**232843**	**232892**	**232912**
Easting	**705005**	**704955**	**704955**	**704971**	**704971**	**704992**	**705003**	**705001**	**705004**	**704992**
2,6-Dinitrotoluene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
2-Chloronaphthalene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
2-Chlorophenol (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
2-Fluorobiphenyl (%)	64	61	52	67		59	74	76	49	58
2-Fluorophenol (%)	62	66	53	82		60	76	79	57	74
2-Methylnaphthalene (ug/kg)	480 J	3600 U	3600 U	50 J		1800 U	3900 U	2100 U	300 J	3700 U
2-Methylphenol (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
2-Nitroaniline (ug/kg)	4800 U	9100 U	9000 U	910 U		4600 U	9800 U	5100 U	10000 U	9300 U
2-Nitrophenol (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
3,3'-Dichlorobenzidine (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
3-Nitroaniline (ug/kg)	4800 U	9100 U	9000 U	910 U		4600 U	9800 U	5100 U	10000 U	9300 U
4,6-Dinitro-2-methylphenol (ug/kg)	4800 U	9100 U	9000 U	910 U		4600 U	9800 U	5100 U	10000 U	9300 U
4-Bromophenyl-phenylether (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
4-Chloro-3-methylphenol (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
4-Chloroaniline (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
4-Chlorophenyl-phenylether (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
4-Methylphenol (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
4-Nitroaniline (ug/kg)	4800 U	9100 U	9000 U	910 U		4600 U	9800 U	5100 U	10000 U	9300 U
4-Nitrophenol (ug/kg)	4800 U	9100 U	9000 U	910 U		4600 U	9800 U	5100 U	10000 U	9300 U
Acenaphthene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Acenaphthylene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Anthracene (ug/kg)	97 J	260 J	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Benzo(a)anthracene (ug/kg)	400 J	690 J	3600 U	85 J		300 J	3900 U	2100 U	230 J	3700 U
Benzo(a)pyrene (ug/kg)	530 J	560 J	3600 U	82 J		260 J	3900 U	2100 U	290 J	3700 U
Benzo(b)fluoranthene (ug/kg)	670 J	520 J	3600 U	79 J		320 J	3900 U	2100 U	400 J	3700 U
Benzo(g,h,i)perylene (ug/kg)	530 J	330 J	3600 U	49 J		160 J	3900 U	2100 U	4000 U	3700 U
Benzo(k)fluoranthene (ug/kg)	520 J	550 J	3600 U	89 J		270 J	3900 U	2100 U	310 J	3700 U
Butylbenzylphthalate (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Carbazole (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Chrysene (ug/kg)	580 J	720 J	3600 U	110 J		360 J	3900 U	2100 U	390 J	200 J
Di-n-butylphthalate (ug/kg)	1900 U	3600 U	3600 U	360 U		110 U	3900 U	200 U	4000 U	3700 U
Di-n-octyl phthalate (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Dibenz(a,h)anthracene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Dibenzofuran (ug/kg)	170 J	3600 U	3600 U	18 J		1800 U	3900 U	2100 U	4000 U	3700 U
Diethylphthalate (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U

Station	**IAA-SB0002**	**IAA-SB0004**	**IAA-SB0004**	**IAA-SB0007**	**IAA-SB0007**	**IAA-SB0013**	**IAA-SB0015**	**IAA-SB0017**	**IAA-SB0023**	**IAA-SB0025**
Sample No	**PVSB0004**	**PVSB0010**	**PVSB0010D**	**PVSB0019**	**PVSB0236**	**PVSB0037**	**PVSB0043**	**PVSB0049**	**PVSB0067**	**PVSB0073**
Collection Date	**09/12/00**	**09/13/00**	**09/13/00**	**09/14/00**	**09/21/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/18/00**	**09/18/00**
Depth (ft)	**0.3-1.3**	**0.0-1.0**	**0.0-1.0**	**0.5-1.5**	**0.5-1.5**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**6.0-8.0**
Duplicate ID			**PVSB9002**							
Northing	**232874**	**232788**	**232788**	**232823**	**232823**	**232913**	**232824**	**232843**	**232892**	**232912**
Easting	**705005**	**704955**	**704955**	**704971**	**704971**	**704992**	**705003**	**705001**	**705004**	**704992**
Dimethylphthalate (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Fluoranthene (ug/kg)	650 J	1700 J	190 J	150 J		740 J	3900 U	2100 U	500 J	270 J
Fluorene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Hexachlorobenzene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Hexachlorobutadiene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Hexachlorocyclopentadiene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Hexachloroethane (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Indeno(1,2,3-cd)pyrene (ug/kg)	470 J	290 J	3600 U	46 J		160 J	3900 U	2100 U	4000 U	3700 U
Isophorone (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
N-Nitroso-di-n-propylamine (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
N-Nitrosodiphenylamine (1) (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Naphthalene (ug/kg)	240 J	3600 U	3600 U	30 J		1800 U	3900 U	2100 U	4000 U	3700 U
Nitrobenzene (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Pentachlorophenol (ug/kg)	4800 U	9100 U	9000 U	910 U		4600 U	9800 U	5100 U	10000 U	9300 U
Phenanthrene (ug/kg)	750 J	1200 J	3600 U	98 J		530 J	3900 U	2100 U	4000 U	3700 U
Phenol (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Pyrene (ug/kg)	480 J	1500 J	3600 U	170 J		790 J	3900 U	2100 U	400 J	3700 U
bis(2-Chloroethoxy)methane (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
bis(2-Chloroethyl)ether (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
bis(2-Ethylhexyl)phthalate (ug/kg)	1900 U	3600 U	3600 U	360 U		1800 U	3900 U	2100 U	4000 U	3700 U
Volatile Organics										
1,1,1-Trichloroethane (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
1,1,2,2-Tetrachloroethane (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
1,1,2-Trichloroethane (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
1,1-Dichloroethane (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
1,1-Dichloroethene (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
1,2-Dichloroethane (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
1,2-Dichloroethene (total) (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
1,2-Dichloropropane (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
2-Butanone (ug/kg)	12 U	11 U	13 U	10 U	11 U	10 U	9 U	11 U	17 U	11 U
2-Hexanone (ug/kg)	12 U	11 U	13 U	10 U	11 U	10 U	9 U	11 U	17 U	11 U
4-Methyl-2-pentanone (ug/kg)	12 U	11 U	13 U	10 U	11 U	10 U	9 U	11 U	17 U	11 U
Acetone (ug/kg)	49 U	11 U	63 U	86 U	72 B	13 B	12 U	41 U	110 U	39 U
Benzene (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Bromodichloromethane (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U

Station	**IAA-SB0002**	**IAA-SB0004**	**IAA-SB0004**	**IAA-SB0007**	**IAA-SB0007**	**IAA-SB0013**	**IAA-SB0015**	**IAA-SB0017**	**IAA-SB0023**	**IAA-SB0025**
Sample No	**PVSB0004**	**PVSB0010**	**PVSB0010D**	**PVSB0019**	**PVSB0236**	**PVSB0037**	**PVSB0043**	**PVSB0049**	**PVSB0067**	**PVSB0073**
Collection Date	**09/12/00**	**09/13/00**	**09/13/00**	**09/14/00**	**09/21/00**	**09/15/00**	**09/15/00**	**09/15/00**	**09/18/00**	**09/18/00**
Depth (ft)	**0.3-1.3**	**0.0-1.0**	**0.0-1.0**	**0.5-1.5**	**0.5-1.5**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**0.0-1.0**	**6.0-8.0**
Duplicate ID			**PVSB9002**							
Northing	**232874**	**232788**	**232788**	**232823**	**232823**	**232913**	**232824**	**232843**	**232892**	**232912**
Easting	**705005**	**704955**	**704955**	**704971**	**704971**	**704992**	**705003**	**705001**	**705004**	**704992**
Bromofluorobenzene (%)	72	68	45 *	115	33 *	69	87	81	94	69
Bromoform (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Bromomethane (ug/kg)	12 U	11 U	13 U	10 U	11 U	10 U	9 U	11 U	17 U	11 U
Carbon Disulfide (ug/kg)	6 U	6 U	6 U	5 U	7	5 U	5 U	6 U	4 J	2 J
Carbon Tetrachloride (ug/kg)	6 U	6 U	2 J	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Chlorobenzene (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Chloroethane (ug/kg)	12 U	11 U	13 U	10 U	11 U	10 U	9 U	11 U	17 U	11 U
Chloroform (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Chloromethane (ug/kg)	12 U	11 U	13 U	10 U	11 U	10 U	9 U	11 U	17 U	11 U
Dibromochloromethane (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Ethylbenzene (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Methylene Chloride (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	5 U	6 U
Styrene (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Tetrachloroethene (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Toluene (ug/kg)	2 J	6 U	6 U	1 U	6 U	2 J	1 J	5 J	3 J	6 U
Trans-1,3-Dichloropropene (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Trichloroethene (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
Vinyl Chloride (ug/kg)	12 U	11 U	13 U	10 U	11 U	10 U	9 U	11 U	17 U	11 U
Xylene (total) (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U
cis-1,3-Dichloropropene (ug/kg)	6 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U	8 U	6 U

Station	**IAA-SB0030**	**IAA-SB0030**	**IAA-SB0031**	**IAA-SB0032**	**IAA-SB0033**	**IAA-SB0034**	**IAA-SB0036**	**IAA-SB0037**
Sample No	**PVSB0088**	**PVSB0088D**	**PVSB0091**	**PVSB0094**	**PVSB0097**	**PVSB0100**	**PVSB0106**	**PVSB0206**
Collection Date	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/20/00**
Depth (ft)	**0.5-1.5**	**0.5-1.5**	**8.0-9.0**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**
Duplicate ID		**PVSB9006**						
Northing	**232811**	**232811**	**232817**	**232813**	**232804**	**232813**	**232913**	**232843**
Easting	**704990**	**704990**	**704996**	**704959**	**704926**	**704946**	**704994**	**704983**
Metals								
Aluminum (mg/kg)	7810 J	8510 J	8270 J	10400 J	11400 J	12000 J	11600 J	10600
Antimony (mg/kg)	0.26 J	0.24 J	1.3 J	0.35 J	0.77 J	0.56 J	0.98 J	0.29
Arsenic (mg/kg)	9.4	8.9	12.6	13.6	15.4	13.5	16.1	10.7
Barium (mg/kg)	68.2	66.1	145	128	204	133	157	71.7
Beryllium (mg/kg)	0.45	0.43	0.65	0.58	0.73	0.78	0.65	0.5
Cadmium (mg/kg)	0.17	0.17	0.69	0.46	0.6	0.45	0.87	0.12
Calcium (mg/kg)	6450 J	5900 J	12800 J	10800 J	12500 J	19800 J	17100 J	5070
Chromium (mg/kg)	35.2 J	40.5 J	79.8 J	65.2 J	111 J	54.8 J	58.3 J	52.5
Cobalt (mg/kg)	6.2	6.4	15.2	11.7	13.4	11.1	12.7	9
Copper (mg/kg)	19.7 J	19.7 J	641 J	68.2 J	315 J	88.8 J	242 J	30.3
Cyanide (mg/kg)	0.36 UJ	0.35 UJ	0.33 UJ	0.33 UJ	0.42 J	0.29 UJ	0.32 J	0.32 U
Iron (mg/kg)	19100 J	18800 J	33100 J	30200 J	50900 J	33600 J	37900 J	24200
Lead (mg/kg)	20.3	19.9	157	40.6	98.1	89.8	246	28.8
Magnesium (mg/kg)	3290	3190	5070	5220	4690	5340	4450	3070
Manganese (mg/kg)	277 J	238 J	586 J	596 J	649 J	592 J	617 J	308
Mercury (mg/kg)	0.04	0.05	0.46	0.08	0.25	0.31	0.16	0.08
Nickel (mg/kg)	14.7 J	15.5 J	692 J	33.1 J	99.1	34	41.2 J	21.1
Potassium (mg/kg)	802	919	1030	1520	1200	1620	1640	1360
Selenium (mg/kg)	0.7	0.72	2.4	1	1	1.2	0.83	1.5
Silver (mg/kg)	0.11 U	0.12 U	0.13	0.11 U	0.12 U	0.11 U	0.19	0.11 U
Sodium (mg/kg)	104	120	333	93.5	138	138	201	1510
Thallium (mg/kg)	0.45 J	0.38 UJ	0.5 J	0.54 J	0.39 UJ	0.63 J	0.36 UJ	0.6
Vanadium (mg/kg)	15.8	16.5	18.2	18.7	19.9	19.8	20.5	16.4
Zinc (mg/kg)	62.3 J	66.6 J	228 J	218 J	367 J	253 J	210 J	90.6
PCBs								
Aroclor-1016 (ug/kg)	37 U	38 U	740 U	36 U	38 U	37 U	360 U	41 U
Aroclor-1221 (ug/kg)	74 U	75 U	1500 U	71 U	77 U	74 U	720 U	82 U
Aroclor-1232 (ug/kg)	37 U	38 U	740 U	36 U	38 U	37 U	360 U	41 U
Aroclor-1242 (ug/kg)	37 U	38 U	740 U	36 U	38 U	37 U	360 U	41 U
Aroclor-1248 (ug/kg)	37 U	38 U	740 U	36 U	38 U	37 U	360 U	41 U
Aroclor-1254 (ug/kg)	37 U	38 U	2900	33 J	38 U	180	1200	180
Aroclor-1260 (ug/kg)	37 U	38 U	740 U	36 U	38 U	37 U	360 U	41 U
Pesticides								
4,4'-DDD (ug/kg)	3.7 U	3.8 UJ	74 U	3.6 UJ	7.7 U	7.4 U	36 U	8.2 U

Station	**IAA-SB0030**	**IAA-SB0030**	**IAA-SB0031**	**IAA-SB0032**	**IAA-SB0033**	**IAA-SB0034**	**IAA-SB0036**	**IAA-SB0037**
Sample No	**PVSB0088**	**PVSB0088D**	**PVSB0091**	**PVSB0094**	**PVSB0097**	**PVSB0100**	**PVSB0106**	**PVSB0206**
Collection Date	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/20/00**
Depth (ft)	**0.5-1.5**	**0.5-1.5**	**8.0-9.0**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**
Duplicate ID		**PVSB9006**						
Northing	**232811**	**232811**	**232817**	**232813**	**232804**	**232813**	**232913**	**232843**
Easting	**704990**	**704990**	**704996**	**704959**	**704926**	**704946**	**704994**	**704983**
4,4'-DDE (ug/kg)	3.7 U	4.9 J	74 U	3.6 UJ	7.7 U	7.4 U	36 U	8.2 U
4,4'-DDT (ug/kg)	3.7 U	3.8 UJ	74 U	3.6 UJ	7.7 U	7.4 U	36 U	8.2 U
Aldrin (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	5.4	3.7 U	18 U	4.1 U
Alpha-BHC (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	3.8 U	3.7 U	18 U	4.1 U
Beta-BHC (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	3.8 U	3.7 U	18 U	4.1 U
Decachlorobiphenyl (%)	52	48	0 D	26 *	69	55	0 D	68
Delta-BHC (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	3.8 U	3.7 U	18 U	4.1 U
Dieldrin (ug/kg)	3.7 U	3.8 UJ	74 U	3.6 UJ	7.7 U	7.4 U	36 U	8.2 U
Endosulfan I (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	3.8 U	3.7 U	18 U	4.1 U
Endosulfan II (ug/kg)	3.7 U	3.8 UJ	74 U	3.6 UJ	7.7 U	7.4 U	36 U	8.2 U
Endosulfan sulfate (ug/kg)	3.7 U	3.8 UJ	74 U	3.6 UJ	7.7 U	7.4 U	36 U	8.2 U
Endrin (ug/kg)	3.7 U	3.8 UJ	74 U	3.6 UJ	7.7 U	7.4 U	36 U	8.2 U
Endrin aldehyde (ug/kg)	3.7 U	3.8 UJ	74 U	3.6 UJ	7.7 U	7.4 U	36 U	8.2 U
Endrin ketone (ug/kg)	3.7 U	3.8 UJ	74 U	3.6 UJ	2.3 J	7.4 U	36 U	8.2 U
Heptachlor (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	3.8 U	3.7 U	18 U	4.1 U
Heptachlor epoxide (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	3.8 U	3.7 U	18 U	4.1 U
Methoxychlor (ug/kg)	18 U	19 UJ	370 U	18 UJ	38 U	37 U	180 U	41 U
Tetrachloro-m-xylene (%)	22 *	24 *	0 D	8 *	25 *	12 *	0 D	25 *
Toxaphene (ug/kg)	180 U	190 UJ	3700 U	180 UJ	380 U	370 U	1800 U	410 U
alpha-Chlordane (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	3.8 U	3.7 U	18 U	4.1 U
gamma-BHC (Lindane) (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	3.8 U	3.7 U	18 U	4.1 U
gamma-Chlordane (ug/kg)	1.8 U	1.9 UJ	37 U	1.8 UJ	3.8 U	3.7 U	18 U	4.1 U
Semivolatile Organics								
1,2,4-Trichlorobenzene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
1,2-Dichlorobenzene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
1,3-Dichlorobenzene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
1,4-Dichlorobenzene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2,2'-oxybis(1-Chloropropane) (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2,4,5-Trichlorophenol (ug/kg)	9400 U	9400 U	9200 U	9000 U	9400 U	19000 U	9000 U	10000 U
2,4,6-Tribromophenol (%)	53	61	30	49	42	48	53	74
2,4,6-Trichlorophenol (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2,4-Dichlorophenol (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2,4-Dimethylphenol (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2,4-Dinitrophenol (ug/kg)	9400 U	9400 U	9200 U	9000 U	9400 U	19000 U	9000 U	10000 U
2,4-Dinitrotoluene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U

Station	IAA-SB0030	IAA-SB0030	IAA-SB0031	IAA-SB0032	IAA-SB0033	IAA-SB0034	IAA-SB0036	IAA-SB0037
Sample No	**PVSB0088**	**PVSB0088D**	**PVSB0091**	**PVSB0094**	**PVSB0097**	**PVSB0100**	**PVSB0106**	**PVSB0206**
Collection Date	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/20/00**
Depth (ft)	**0.5-1.5**	**0.5-1.5**	**8.0-9.0**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**
Duplicate ID		**PVSB9006**						
Northing	**232811**	**232811**	**232817**	**232813**	**232804**	**232813**	**232913**	**232843**
Easting	**704990**	**704990**	**704996**	**704959**	**704926**	**704946**	**704994**	**704983**
2,6-Dinitrotoluene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2-Chloronaphthalene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2-Chlorophenol (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2-Fluorobiphenyl (%)	60	67	44	56	47	64	58	84
2-Fluorophenol (%)	69	79	48	73	66	62	76	83
2-Methylnaphthalene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2-Methylphenol (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
2-Nitroaniline (ug/kg)	9400 U	9400 U	9200 U	9000 U	9400 U	19000 U	9000 U	10000 U
2-Nitrophenol (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
3,3'-Dichlorobenzidine (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
3-Nitroaniline (ug/kg)	9400 U	9400 U	9200 U	9000 U	9400 U	19000 U	9000 U	10000 U
4,6-Dinitro-2-methylphenol (ug/kg)	9400 U	9400 U	9200 U	9000 U	9400 U	19000 U	9000 U	10000 U
4-Bromophenyl-phenylether (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
4-Chloro-3-methylphenol (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
4-Chloroaniline (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
4-Chlorophenyl-phenylether (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
4-Methylphenol (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
4-Nitroaniline (ug/kg)	9400 U	9400 U	9200 U	9000 U	9400 U	19000 U	9000 U	10000 U
4-Nitrophenol (ug/kg)	9400 U	9400 U	9200 U	9000 U	9400 U	19000 U	9000 U	10000 U
Acenaphthene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	750 J	3600 U	4100 U
Acenaphthylene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	1400 J	3600 U	4100 U
Anthracene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	4000 J	3600 U	4100 U
Benzo(a)anthracene (ug/kg)	3800 U	3800 U	3700 U	300 J	660 J	14000	3600 U	260 J
Benzo(a)pyrene (ug/kg)	3800 U	3800 U	3700 U	310 J	750 J	10000	190 J	4100 U
Benzo(b)fluoranthene (ug/kg)	3800 U	3800 U	3700 U	270 J	710 J	9000	240 J	4100 U
Benzo(g,h,i)perylene (ug/kg)	3800 U	3800 U	3700 U	3600 U	450 J	6500 J	3600 U	4100 U
Benzo(k)fluoranthene (ug/kg)	3800 U	3800 U	3700 U	340 J	740 J	11000	3600 U	4100 U
Butylbenzylphthalate (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Carbazole (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Chrysene (ug/kg)	3800 U	3800 U	3700 U	370 J	810 J	13000	260 J	360 J
Di-n-butylphthalate (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Di-n-octyl phthalate (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Dibenz(a,h)anthracene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	2800 J	3600 U	4100 U
Dibenzofuran (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	750 J	3600 U	4100 U
Diethylphthalate (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U

Station	IAA-SB0030	IAA-SB0030	IAA-SB0031	IAA-SB0032	IAA-SB0033	IAA-SB0034	IAA-SB0036	IAA-SB0037
Sample No	**PVSB0088**	**PVSB0088D**	**PVSB0091**	**PVSB0094**	**PVSB0097**	**PVSB0100**	**PVSB0106**	**PVSB0206**
Collection Date	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/20/00**
Depth (ft)	**0.5-1.5**	**0.5-1.5**	**8.0-9.0**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**
Duplicate ID		**PVSB9006**						
Northing	**232811**	**232811**	**232817**	**232813**	**232804**	**232813**	**232913**	**232843**
Easting	**704990**	**704990**	**704996**	**704959**	**704926**	**704946**	**704994**	**704983**
Dimethylphthalate (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Fluoranthene (ug/kg)	3800 U	3800 U	3700 U	540 J	1300 J	33000	290 J	330 J
Fluorene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	1900 J	3600 U	4100 U
Hexachlorobenzene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Hexachlorobutadiene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Hexachlorocyclopentadiene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Hexachloroethane (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Indeno(1,2,3-cd)pyrene (ug/kg)	3800 U	3800 U	3700 U	3600 U	450 J	6000 J	3600 U	4100 U
Isophorone (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
N-Nitroso-di-n-propylamine (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
N-Nitrosodiphenylamine (1) (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Naphthalene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	560 J	3600 U	4100 U
Nitrobenzene (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Pentachlorophenol (ug/kg)	9400 U	9400 U	9200 U	9000 U	9400 U	19000 U	9000 U	10000 U
Phenanthrene (ug/kg)	3800 U	3800 U	3700 U	3600 U	600 J	19000	3600 U	270 J
Phenol (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
Pyrene (ug/kg)	3800 U	3800 U	3700 U	530 J	1100 J	27000	230 J	430 J
bis(2-Chloroethoxy)methane (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
bis(2-Chloroethyl)ether (ug/kg)	3800 U	3800 U	3700 U	3600 U	3800 U	7400 U	3600 U	4100 U
bis(2-Ethylhexyl)phthalate (ug/kg)	3800 U	3800 U	3700 U	220 J	3800 U	7400 U	3600 U	4100 U
Volatile Organics								
1,1,1-Trichloroethane (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
1,1,2,2-Tetrachloroethane (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
1,1,2-Trichloroethane (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
1,1-Dichloroethane (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
1,1-Dichloroethene (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
1,2-Dichloroethane (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
1,2-Dichloroethene (total) (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
1,2-Dichloropropane (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
2-Butanone (ug/kg)	10 U	12 U	9 U	11 U	11 U	10 U	12 U	12 U
2-Hexanone (ug/kg)	10 U	12 U	9 U	11 U	11 U	10 U	12 U	12 U
4-Methyl-2-pentanone (ug/kg)	10 U	12 U	9 U	11 U	11 U	10 U	12 U	12 U
Acetone (ug/kg)	71 U	69 U	25 U	170 U	82 U	38 U	72 U	83 U
Benzene (ug/kg)	5 U	6 U	1 J	6 U	6 U	5 U	6 U	1 J
Bromodichloromethane (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U

Station	IAA-SB0030	IAA-SB0030	IAA-SB0031	IAA-SB0032	IAA-SB0033	IAA-SB0034	IAA-SB0036	IAA-SB0037
Sample No	**PVSB0088**	**PVSB0088D**	**PVSB0091**	**PVSB0094**	**PVSB0097**	**PVSB0100**	**PVSB0106**	**PVSB0206**
Collection Date	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/19/00**	**09/20/00**
Depth (ft)	**0.5-1.5**	**0.5-1.5**	**8.0-9.0**	**8.0-10.0**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**	**0.5-1.5**
Duplicate ID		**PVSB9006**						
Northing	**232811**	**232811**	**232817**	**232813**	**232804**	**232813**	**232913**	**232843**
Easting	**704990**	**704990**	**704996**	**704959**	**704926**	**704946**	**704994**	**704983**
Bromofluorobenzene (%)	99	83	99	158 *	98	60 *	105	94
Bromoform (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
Bromomethane (ug/kg)	10 U	12 U	9 U	11 U	11 U	10 U	12 U	12 U
Carbon Disulfide (ug/kg)	6	3 J	2 J	2 J	6 U	7	1 J	10
Carbon Tetrachloride (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
Chlorobenzene (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
Chloroethane (ug/kg)	10 U	12 U	9 U	11 U	11 U	10 U	12 U	12 U
Chloroform (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
Chloromethane (ug/kg)	10 U	12 U	9 U	11 U	11 U	10 U	12 U	12 U
Dibromochloromethane (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
Ethylbenzene (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
Methylene Chloride (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
Styrene (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
Tetrachloroethene (ug/kg)	5 U	6 U	5 U	6	6 U	5 U	6 U	6 U
Toluene (ug/kg)	5 U	6 U	1 J	6 U	6 U	5 U	6 U	6 U
Trans-1,3-Dichloropropene (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U
Trichloroethene (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	1 J
Vinyl Chloride (ug/kg)	10 U	12 U	9 U	11 U	11 U	10 U	12 U	12 U
Xylene (total) (ug/kg)	1 J	6 U	5 U	6 U	6 U	5 U	6 U	6 U
cis-1,3-Dichloropropene (ug/kg)	5 U	6 U	5 U	6 U	6 U	5 U	6 U	6 U

Station	**IAB-SB0001**	**IAB-SB0002**
Sample No	**PVSB0221**	**PVSB0218**
Collection Date	**09/20/00**	**09/20/00**
Depth (ft)	**0.5-1.5**	**0.0-1.0**
Duplicate ID		
Northing	**232904**	**232926**
Easting	**705250**	**705232**
Metals		
Aluminum (mg/kg)	18900	13100
Antimony (mg/kg)	0.57	0.2 U
Arsenic (mg/kg)	11.4	14.9
Barium (mg/kg)	636	100
Beryllium (mg/kg)	2.8	0.85
Cadmium (mg/kg)	0.34	0.03 U
Calcium (mg/kg)	133000	14700
Chromium (mg/kg)	49.7	29.9
Cobalt (mg/kg)	4.4	11
Copper (mg/kg)	74.3	29.7
Cyanide (mg/kg)	0.26 U	0.28 U
Iron (mg/kg)	24300	30300
Lead (mg/kg)	50.8	28.4
Magnesium (mg/kg)	14600	5830
Manganese (mg/kg)	2410	522
Mercury (mg/kg)	0.13	0.03
Nickel (mg/kg)	21.6	28.1
Potassium (mg/kg)	1960	1350
Selenium (mg/kg)	1.4	0.59
Silver (mg/kg)	1.1 U	0.11 U
Sodium (mg/kg)	759	119
Thallium (mg/kg)	0.36 U	0.7
Vanadium (mg/kg)	14.3	18.6
Zinc (mg/kg)	77	72.5
PCBs		
Aroclor-1016 (ug/kg)	36 U	37 U
Aroclor-1221 (ug/kg)	72 U	74 U
Aroclor-1232 (ug/kg)	36 U	37 U
Aroclor-1242 (ug/kg)	36 U	37 U
Aroclor-1248 (ug/kg)	36 U	37 U
Aroclor-1254 (ug/kg)	170	37 U
Aroclor-1260 (ug/kg)	36 U	37 U

Station	IAB-SB0001	IAB-SB0002
Sample No	PVSB0221	PVSB0218
Collection Date	09/20/00	09/20/00
Depth (ft)	0.5-1.5	0.0-1.0
Duplicate ID		
Northing	232904	232926
Easting	705250	705232
Pesticides		
4,4'-DDD (ug/kg)	7.2 U	7.4 U
4,4'-DDE (ug/kg)	7.2 U	7.4 U
4,4'-DDT (ug/kg)	7.2 U	7.4 U
Aldrin (ug/kg)	3.6 U	3.7 U
Alpha-BHC (ug/kg)	3.6 U	3.7 U
Beta-BHC (ug/kg)	3.6 U	3.7 U
Decachlorobiphenyl (%)	62	60
Delta-BHC (ug/kg)	3.6 U	3.7 U
Dieldrin (ug/kg)	7.2 U	7.4 U
Endosulfan I (ug/kg)	3.6 U	3.7 U
Endosulfan II (ug/kg)	7.2 U	7.4 U
Endosulfan sulfate (ug/kg)	7.2 U	7.4 U
Endrin (ug/kg)	7.2 U	7.4 U
Endrin aldehyde (ug/kg)	7.2 U	7.4 U
Endrin ketone (ug/kg)	7.2 U	7.4 U
Heptachlor (ug/kg)	3.6 U	3.7 U
Heptachlor epoxide (ug/kg)	3.6 U	3.7 U
Methoxychlor (ug/kg)	36 U	37 U
Tetrachloro-m-xylene (%)	24 *	25 *
Toxaphene (ug/kg)	360 U	370 U
alpha-Chlordane (ug/kg)	3.6 U	3.7 U
gamma-BHC (Lindane) (ug/kg)	3.6 U	3.7 U
gamma-Chlordane (ug/kg)	3.6 U	3.7 U
Semivolatile Organics		
1,2,4-Trichlorobenzene (ug/kg)	3500 U	3700 U
1,2-Dichlorobenzene (ug/kg)	3500 U	3700 U
1,3-Dichlorobenzene (ug/kg)	3500 U	3700 U
1,4-Dichlorobenzene (ug/kg)	3500 U	3700 U
2,2'-oxybis(1-Chloropropane) (ug/kg)	3500 U	3700 U
2,4,5-Trichlorophenol (ug/kg)	8700 U	9200 U
2,4,6-Tribromophenol (%)	71	43
2,4,6-Trichlorophenol (ug/kg)	3500 U	3700 U
2,4-Dichlorophenol (ug/kg)	3500 U	3700 U
2,4-Dimethylphenol (ug/kg)	3500 U	3700 U

Station	IAB-SB0001	IAB-SB0002
Sample No	PVSB0221	PVSB0218
Collection Date	09/20/00	09/20/00
Depth (ft)	0.5-1.5	0.0-1.0
Duplicate ID		
Northing	232904	232926
Easting	705250	705232
2,4-Dinitrophenol (ug/kg)	8700 U	9200 U
2,4-Dinitrotoluene (ug/kg)	3500 U	3700 U
2,6-Dinitrotoluene (ug/kg)	3500 U	3700 U
2-Chloronaphthalene (ug/kg)	3500 U	3700 U
2-Chlorophenol (ug/kg)	3500 U	3700 U
2-Fluorobiphenyl (%)	70	53
2-Fluorophenol (%)	69	60
2-Methylnaphthalene (ug/kg)	3500 U	3700 U
2-Methylphenol (ug/kg)	3500 U	3700 U
2-Nitroaniline (ug/kg)	8700 U	9200 U
2-Nitrophenol (ug/kg)	3500 U	3700 U
3,3'-Dichlorobenzidine (ug/kg)	3500 U	3700 U
3-Nitroaniline (ug/kg)	8700 U	9200 U
4,6-Dinitro-2-methylphenol (ug/kg)	8700 U	9200 U
4-Bromophenyl-phenylether (ug/kg)	3500 U	3700 U
4-Chloro-3-methylphenol (ug/kg)	3500 U	3700 U
4-Chloroaniline (ug/kg)	3500 U	3700 U
4-Chlorophenyl-phenylether (ug/kg)	3500 U	3700 U
4-Methylphenol (ug/kg)	3500 U	3700 U
4-Nitroaniline (ug/kg)	8700 U	9200 U
4-Nitrophenol (ug/kg)	8700 U	9200 U
Acenaphthene (ug/kg)	3500 U	3700 U
Acenaphthylene (ug/kg)	3500 U	3700 U
Anthracene (ug/kg)	3500 U	210 J
Benzo(a)anthracene (ug/kg)	400 J	680 J
Benzo(a)pyrene (ug/kg)	350 J	550 J
Benzo(b)fluoranthene (ug/kg)	320 J	530 J
Benzo(g,h,i)perylene (ug/kg)	3500 U	3700 U
Benzo(k)fluoranthene (ug/kg)	390 J	560 J
Butylbenzylphthalate (ug/kg)	3500 U	3700 U
Carbazole (ug/kg)	3500 U	3700 U
Chrysene (ug/kg)	490 J	710 J
Di-n-butylphthalate (ug/kg)	3500 U	3700 U
Di-n-octyl phthalate (ug/kg)	3500 U	3700 U
Dibenz(a,h)anthracene (ug/kg)	3500 U	3700 U

Station	**IAB-SB0001**	**IAB-SB0002**
Sample No	**PVSB0221**	**PVSB0218**
Collection Date	**09/20/00**	**09/20/00**
Depth (ft)	**0.5-1.5**	**0.0-1.0**
Duplicate ID		
Northing	**232904**	**232926**
Easting	**705250**	**705232**
Dibenzofuran (ug/kg)	3500 U	3700 U
Diethylphthalate (ug/kg)	3500 U	3700 U
Dimethylphthalate (ug/kg)	3500 U	3700 U
Fluoranthene (ug/kg)	860 J	1800 J
Fluorene (ug/kg)	3500 U	3700 U
Hexachlorobenzene (ug/kg)	3500 U	3700 U
Hexachlorobutadiene (ug/kg)	3500 U	3700 U
Hexachlorocyclopentadiene (ug/kg)	3500 U	3700 U
Hexachloroethane (ug/kg)	3500 U	3700 U
Indeno(1,2,3-cd)pyrene (ug/kg)	3500 U	270 J
Isophorone (ug/kg)	3500 U	3700 U
N-Nitroso-di-n-propylamine (ug/kg)	3500 U	3700 U
N-Nitrosodiphenylamine (1) (ug/kg)	3500 U	3700 U
Naphthalene (ug/kg)	3500 U	3700 U
Nitrobenzene (ug/kg)	3500 U	3700 U
Pentachlorophenol (ug/kg)	8700 U	9200 U
Phenanthrene (ug/kg)	410 J	960 J
Phenol (ug/kg)	3500 U	3700 U
Pyrene (ug/kg)	750 J	1300 J
bis(2-Chloroethoxy)methane (ug/kg)	3500 U	3700 U
bis(2-Chloroethyl)ether (ug/kg)	3500 U	3700 U
bis(2-Ethylhexyl)phthalate (ug/kg)	3500 U	3700 U
Volatile Organics		
1,1,1-Trichloroethane (ug/kg)	6 U	5 U
1,1,2,2-Tetrachloroethane (ug/kg)	6 U	5 U
1,1,2-Trichloroethane (ug/kg)	6 U	5 U
1,1-Dichloroethane (ug/kg)	6 U	5 U
1,1-Dichloroethene (ug/kg)	6 U	5 U
1,2-Dichloroethane (ug/kg)	6 U	5 U
1,2-Dichloroethene (total) (ug/kg)	6 U	5 U
1,2-Dichloropropane (ug/kg)	6 U	5 U
2-Butanone (ug/kg)	13 U	10 U
2-Hexanone (ug/kg)	13 U	10 U
4-Methyl-2-pentanone (ug/kg)	13 U	10 U
Acetone (ug/kg)	29 U	36 U

Station	IAB-SB0001	IAB-SB0002
Sample No	PVSB0221	PVSB0218
Collection Date	09/20/00	09/20/00
Depth (ft)	0.5-1.5	0.0-1.0
Duplicate ID		
Northing	232904	232926
Easting	705250	705232
Benzene (ug/kg)	6 U	5 U
Bromodichloromethane (ug/kg)	6 U	5 U
Bromofluorobenzene (%)	67	85
Bromoform (ug/kg)	6 U	5 U
Bromomethane (ug/kg)	13 U	10 U
Carbon Disulfide (ug/kg)	5 J	2 J
Carbon Tetrachloride (ug/kg)	6 U	5 U
Chlorobenzene (ug/kg)	6 U	5 U
Chloroethane (ug/kg)	13 U	10 U
Chloroform (ug/kg)	6 U	5 U
Chloromethane (ug/kg)	13 U	10 U
Dibromochloromethane (ug/kg)	6 U	5 U
Ethylbenzene (ug/kg)	6 U	5 U
Methylene Chloride (ug/kg)	6 U	5 U
Styrene (ug/kg)	6 U	5 U
Tetrachloroethene (ug/kg)	6 U	5 U
Toluene (ug/kg)	6 U	5 U
Trans-1,3-Dichloropropene (ug/kg)	6 U	5 U
Trichloroethene (ug/kg)	6 U	5 U
Vinyl Chloride (ug/kg)	13 U	10 U
Xylene (total) (ug/kg)	6 U	5 U
cis-1,3-Dichloropropene (ug/kg)	6 U	5 U

Station	**IAD-SB0004**
Sample No	**PVSB0215**
Collection Date	**09/20/00**
Depth (ft)	**0.0-1.0**
Duplicate ID	
Northing	**232703**
Easting	**705229**
Metals	
Aluminum (mg/kg)	13200
Antimony (mg/kg)	0.2
Arsenic (mg/kg)	7.7
Barium (mg/kg)	205
Beryllium (mg/kg)	1.6
Cadmium (mg/kg)	0.43
Calcium (mg/kg)	91400
Chromium (mg/kg)	42
Cobalt (mg/kg)	4.2
Copper (mg/kg)	43.8
Cyanide (mg/kg)	0.29 U
Iron (mg/kg)	19900
Lead (mg/kg)	99.2
Magnesium (mg/kg)	24800
Manganese (mg/kg)	1480
Mercury (mg/kg)	0.07
Nickel (mg/kg)	16.6
Potassium (mg/kg)	1380
Selenium (mg/kg)	0.83
Silver (mg/kg)	0.1 U
Sodium (mg/kg)	484
Thallium (mg/kg)	0.32 U
Vanadium (mg/kg)	11.9
Zinc (mg/kg)	97.3
PCBs	
Aroclor-1016 (ug/kg)	35 U
Aroclor-1221 (ug/kg)	69 U
Aroclor-1232 (ug/kg)	35 U
Aroclor-1242 (ug/kg)	35 U
Aroclor-1248 (ug/kg)	35 U
Aroclor-1254 (ug/kg)	35 U
Aroclor-1260 (ug/kg)	35 U
Pesticides	
4,4'-DDD (ug/kg)	6.9 U

Station	**IAD-SB0004**
Sample No	**PVSB0215**
Collection Date	**09/20/00**
Depth (ft)	**0.0-1.0**
Duplicate ID	
Northing	**232703**
Easting	**705229**
4,4'-DDE (ug/kg)	6.9 U
4,4'-DDT (ug/kg)	6.9 U
Aldrin (ug/kg)	3.5 U
Alpha-BHC (ug/kg)	3.5 U
Beta-BHC (ug/kg)	3.5 U
Decachlorobiphenyl (%)	253 *
Delta-BHC (ug/kg)	3.5 U
Dieldrin (ug/kg)	6.9 U
Endosulfan I (ug/kg)	3.5 U
Endosulfan II (ug/kg)	6.9 U
Endosulfan sulfate (ug/kg)	6.9 U
Endrin (ug/kg)	6.9 U
Endrin aldehyde (ug/kg)	6.9 U
Endrin ketone (ug/kg)	6.9 U
Heptachlor (ug/kg)	3.5 U
Heptachlor epoxide (ug/kg)	3.5 U
Methoxychlor (ug/kg)	35 U
Tetrachloro-m-xylene (%)	14 *
Toxaphene (ug/kg)	350 U
alpha-Chlordane (ug/kg)	3.5 U
gamma-BHC (Lindane) (ug/kg)	3.5 U
gamma-Chlordane (ug/kg)	3.5 U
Semivolatile Organics	
1,2,4-Trichlorobenzene (ug/kg)	1700 U
1,2-Dichlorobenzene (ug/kg)	1700 U
1,3-Dichlorobenzene (ug/kg)	1700 U
1,4-Dichlorobenzene (ug/kg)	1700 U
2,2'-oxybis(1-Chloropropane) (ug/kg)	1700 U
2,4,5-Trichlorophenol (ug/kg)	4200 U
2,4,6-Tribromophenol (%)	67
2,4,6-Trichlorophenol (ug/kg)	1700 U
2,4-Dichlorophenol (ug/kg)	1700 U
2,4-Dimethylphenol (ug/kg)	1700 U
2,4-Dinitrophenol (ug/kg)	4200 U
2,4-Dinitrotoluene (ug/kg)	1700 U

Station	**IAD-SB0004**
Sample No	**PVSB0215**
Collection Date	**09/20/00**
Depth (ft)	**0.0-1.0**
Duplicate ID	
Northing	**232703**
Easting	**705229**
2,6-Dinitrotoluene (ug/kg)	1700 U
2-Chloronaphthalene (ug/kg)	1700 U
2-Chlorophenol (ug/kg)	1700 U
2-Fluorobiphenyl (%)	60
2-Fluorophenol (%)	69
2-Methylnaphthalene (ug/kg)	1700 U
2-Methylphenol (ug/kg)	1700 U
2-Nitroaniline (ug/kg)	4200 U
2-Nitrophenol (ug/kg)	1700 U
3,3'-Dichlorobenzidine (ug/kg)	1700 U
3-Nitroaniline (ug/kg)	4200 U
4,6-Dinitro-2-methylphenol (ug/kg)	4200 U
4-Bromophenyl-phenylether (ug/kg)	1700 U
4-Chloro-3-methylphenol (ug/kg)	1700 U
4-Chloroaniline (ug/kg)	1700 U
4-Chlorophenyl-phenylether (ug/kg)	1700 U
4-Methylphenol (ug/kg)	1700 U
4-Nitroaniline (ug/kg)	4200 U
4-Nitrophenol (ug/kg)	4200 U
Acenaphthene (ug/kg)	1700 U
Acenaphthylene (ug/kg)	1700 U
Anthracene (ug/kg)	190 J
Benzo(a)anthracene (ug/kg)	1200 J
Benzo(a)pyrene (ug/kg)	1100 J
Benzo(b)fluoranthene (ug/kg)	1200 J
Benzo(g,h,i)perylene (ug/kg)	760 J
Benzo(k)fluoranthene (ug/kg)	1200 J
Butylbenzylphthalate (ug/kg)	1700 U
Carbazole (ug/kg)	130 J
Chrysene (ug/kg)	1500 J
Di-n-butylphthalate (ug/kg)	1700 U
Di-n-octyl phthalate (ug/kg)	1700 U
Dibenz(a,h)anthracene (ug/kg)	310 J
Dibenzofuran (ug/kg)	1700 U
Diethylphthalate (ug/kg)	1700 U

Station	**IAD-SB0004**
Sample No	**PVSB0215**
Collection Date	**09/20/00**
Depth (ft)	**0.0-1.0**
Duplicate ID	
Northing	**232703**
Easting	**705229**
Dimethylphthalate (ug/kg)	1700 U
Fluoranthene (ug/kg)	3300
Fluorene (ug/kg)	1700 U
Hexachlorobenzene (ug/kg)	120 J
Hexachlorobutadiene (ug/kg)	1700 U
Hexachlorocyclopentadiene (ug/kg)	1700 U
Hexachloroethane (ug/kg)	1700 U
Indeno(1,2,3-cd)pyrene (ug/kg)	760 J
Isophorone (ug/kg)	1700 U
N-Nitroso-di-n-propylamine (ug/kg)	1700 U
N-Nitrosodiphenylamine (1) (ug/kg)	1700 U
Naphthalene (ug/kg)	1700 U
Nitrobenzene (ug/kg)	1700 U
Pentachlorophenol (ug/kg)	4200 U
Phenanthrene (ug/kg)	1500 J
Phenol (ug/kg)	1700 U
Pyrene (ug/kg)	2400
bis(2-Chloroethoxy)methane (ug/kg)	1700 U
bis(2-Chloroethyl)ether (ug/kg)	1700 U
bis(2-Ethylhexyl)phthalate (ug/kg)	360 J
Volatile Organics	
1,1,1-Trichloroethane (ug/kg)	6 U
1,1,2,2-Tetrachloroethane (ug/kg)	6 U
1,1,2-Trichloroethane (ug/kg)	6 U
1,1-Dichloroethane (ug/kg)	6 U
1,1-Dichloroethene (ug/kg)	6 U
1,2-Dichloroethane (ug/kg)	6 U
1,2-Dichloroethene (total) (ug/kg)	6 U
1,2-Dichloropropane (ug/kg)	6 U
2-Butanone (ug/kg)	11 U
2-Hexanone (ug/kg)	11 U
4-Methyl-2-pentanone (ug/kg)	11 U
Acetone (ug/kg)	41 U
Benzene (ug/kg)	6 U
Bromodichloromethane (ug/kg)	6 U

Station	**IAD-SB0004**
Sample No	**PVSB0215**
Collection Date	**09/20/00**
Depth (ft)	**0.0-1.0**
Duplicate ID	
Northing	**232703**
Easting	**705229**
Bromofluorobenzene (%)	62 *
Bromoform (ug/kg)	6 U
Bromomethane (ug/kg)	11 U
Carbon Disulfide (ug/kg)	3 J
Carbon Tetrachloride (ug/kg)	6 U
Chlorobenzene (ug/kg)	6 U
Chloroethane (ug/kg)	11 U
Chloroform (ug/kg)	6 U
Chloromethane (ug/kg)	11 U
Dibromochloromethane (ug/kg)	6 U
Ethylbenzene (ug/kg)	6 U
Methylene Chloride (ug/kg)	6 U
Styrene (ug/kg)	6 U
Tetrachloroethene (ug/kg)	6 U
Toluene (ug/kg)	6 U
Trans-1,3-Dichloropropene (ug/kg)	6 U
Trichloroethene (ug/kg)	6 U
Vinyl Chloride (ug/kg)	11 U
Xylene (total) (ug/kg)	6 U
cis-1,3-Dichloropropene (ug/kg)	6 U

Station	IAP1B-SB0005	IAP1B-SB0005	IAP1B-SB0007	IAP1B-SB0008	IAP1B-SB0009	IAP1B-SB0012	IAP1B-SB0016
Sample No	**PVSB0127**	**PVSB0127D**	**PVSB0133**	**PVSB0136**	**PVSB0139**	**PVSB0148**	**PVSB0160**
Collection Date	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/08/00**	**09/12/00**
Depth (ft)	**1.0-2.5**	**1.0-2.5**	**0.5-1.5**	**1.0-2.0**	**1.1-2.1**	**3.5-5.5**	**4.0-5.0**
Duplicate ID		**PVSB9001**					
Northing	**232773**	**232773**	**232803**	**232774**	**232752**	**232791**	**232764**
Easting	**705191**	**705191**	**705188**	**705229**	**705231**	**705134**	**705245**
Metals							
Aluminum (mg/kg)	7780	8650	10600	11200	6820	12800	8050
Antimony (mg/kg)	0.31	0.39	0.47	0.22	0.28	0.24	1.2
Arsenic (mg/kg)	7.4	22.3	12.6	11.9	13.5	9.6	15.1
Barium (mg/kg)	56.7	54.1	61.5	67.8	52.7	95.6	83.7
Beryllium (mg/kg)	0.49	0.5	0.56	0.57	34	1.4	0.36
Cadmium (mg/kg)	0.05	0.03 U	0.04	0.04	0.07	0.03 U	0.03 U
Calcium (mg/kg)	9740	2830	7760	26000	19400	36700	4450
Chromium (mg/kg)	17.7	14	20.2	19.2	11.6	19.3	24.9
Cobalt (mg/kg)	6	8.7	11.3	11.8	5.9	6.1	8.1
Copper (mg/kg)	21.9	29.1	32.5	27.4	27.5	46.7	202
Cyanide (mg/kg)	0.24 U	0.27 U	0.3 U	0.31 U	0.36 U		0.34 U
Iron (mg/kg)	17500	33100	28800	28300	22400	17400	40200
Lead (mg/kg)	16.2	16.2	18.3	14.3	26.4	42.3	31.9
Magnesium (mg/kg)	4510	2600	4870	9960	4170	7300	3240
Manganese (mg/kg)	319	339	452	384	306	1270	207
Mercury (mg/kg)	0.03	0.02	0.03	0.04	0.03	0.02	0.05
Nickel (mg/kg)	15	21.7	25.8	30.1	18.9	13.5	42.4
Potassium (mg/kg)	774	1230	1350	2480	1100	1160	1300
Selenium (mg/kg)	0.42 U	0.43 U	0.45 U	0.44 U	0.44 U	0.51	0.48 U
Silver (mg/kg)	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.12 U	0.12 U
Sodium (mg/kg)	160	131	276	174	128	487	77.3
Thallium (mg/kg)	0.35 U	0.36 U	0.38 U	0.37 U	0.37 U	0.54	0.4 U
Vanadium (mg/kg)	15.3	17.4	18.1	18.6	11.7	14	15.5
Zinc (mg/kg)	47.6	59.9	71	73.1	80.2	45.2	94.4
PCBs							
Aroclor-1016 (ug/kg)	35 U	190 U	38 U	37 U	38 U	39 U	390 U
Aroclor-1221 (ug/kg)	70 U	380 U	76 U	74 U	75 U	78 U	770 U
Aroclor-1232 (ug/kg)	35 U	190 U	38 U	37 U	38 U	39 U	390 U
Aroclor-1242 (ug/kg)	35 U	190 U	38 U	37 U	38 U	39 U	390 U
Aroclor-1248 (ug/kg)	35 U	190 U	38 U	37 U	38 U	39 U	390 U
Aroclor-1254 (ug/kg)	35 U	190 U	38 U	37 U	38 U	39 U	2400
Aroclor-1260 (ug/kg)	35 U	190 U	38 U	37 U	38 U	39 U	390 U

Station	IAP1B-SB0005	IAP1B-SB0005	IAP1B-SB0007	IAP1B-SB0008	IAP1B-SB0009	IAP1B-SB0012	IAP1B-SB0016
Sample No	**PVSB0127**	**PVSB0127D**	**PVSB0133**	**PVSB0136**	**PVSB0139**	**PVSB0148**	**PVSB0160**
Collection Date	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/08/00**	**09/12/00**
Depth (ft)	**1.0-2.5**	**1.0-2.5**	**0.5-1.5**	**1.0-2.0**	**1.1-2.1**	**3.5-5.5**	**4.0-5.0**
Duplicate ID		**PVSB9001**					
Northing	**232773**	**232773**	**232803**	**232774**	**232752**	**232791**	**232764**
Easting	**705191**	**705191**	**705188**	**705229**	**705231**	**705134**	**705245**
Pesticides							
4,4'-DDD (ug/kg)	18 U	38 U	3.8 U	3.7 U	7.5 U	39 U	39 U
4,4'-DDE (ug/kg)	18 U	38 U	3.8 U	3.7 U	7.5 U	39 U	53
4,4'-DDT (ug/kg)	18 U	38 U	3.8 U	3.7 U	7.5 U	39 U	200
Aldrin (ug/kg)	8.8 U	19 U	1.9 U	1.8 U	3.8 U	19 U	19 U
Alpha-BHC (ug/kg)	8.8 U	19 U	1.9 U	1.8 U	3.8 U	19 U	19 U
Beta-BHC (ug/kg)	8.8 U	19 U	1.9 U	1.8 U	3.8 U	19 U	19 U
Decachlorobiphenyl (%)	149 *	0 D	131 *	121	427 *	80	0 D
Decachlorobiphenyl (ug/kg)	0 D	0 D	99	97	283 *		
Delta-BHC (ug/kg)	8.8 U	19 U	14	1.8 U	3.8 U	19 U	19 U
Dieldrin (ug/kg)	18 U	38 U	3.8 U	3.7 U	7.5 U	39 U	97
Endosulfan I (ug/kg)	8.8 U	19 U	1.9 U	1.8 U	3.8 U	19 U	19 U
Endosulfan II (ug/kg)	18 U	38 U	3.8 U	3.7 U	7.5 U	39 U	39 U
Endosulfan sulfate (ug/kg)	18 U	38 U	3.8 U	3.7 U	7.5 U	39 U	39 U
Endrin (ug/kg)	18 U	38 U	3.8 U	3.7 U	7.5 U	39 U	39 U
Endrin aldehyde (ug/kg)	18 U	38 U	3.8 U	3.7 U	7.5 U	39 U	39 U
Endrin ketone (ug/kg)	18 U	38 U	3.8 U	3.7 U	7.5 U	39 U	39 U
Heptachlor (ug/kg)	8.8 U	19 U	1.9 U	1.8 U	3.8 U	19 U	19 U
Heptachlor epoxide (ug/kg)	8.8 U	19 U	1.9 U	1.8 U	3.8 U	19 U	19 U
Methoxychlor (ug/kg)	88 U	190 U	19 U	18 U	38 U	190 U	190 U
Tetrachloro-m-xylene (%)	118	0 D	108	95	130 *	30	0 D
Tetrachloro-m-xylene (ug/kg)	0 D	0 D	98	90	110		
Toxaphene (ug/kg)	880 U	1900 U	190 U	180 U	380 U	1900 U	1900 U
alpha-Chlordane (ug/kg)	8.8 U	19 U	1.9 U	1.8 U	3.8 U	19 U	19 U
gamma-BHC (Lindane) (ug/kg)	8.8 U	19 U	1.9 U	1.8 U	3.8 U	19 U	19 U
gamma-Chlordane (ug/kg)	8.8 U	19 U	1.9 U	1.8 U	3.8 U	19 U	19 U
Semivolatile Organics							
1,2,4-Trichlorobenzene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
1,2-Dichlorobenzene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
1,3-Dichlorobenzene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
1,4-Dichlorobenzene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2,2'-oxybis(1-Chloropropane) (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2,4,5-Trichlorophenol (ug/kg)	880 U	930 U	950 U	1800 U	1900 U	4900 U	4700 U
2,4,6-Tribromophenol (%)						49	65
2,4,6-Tribromophenol (ug/kg)	94	112	101	107	108		

Station	IAP1B-SB0005	IAP1B-SB0005	IAP1B-SB0007	IAP1B-SB0008	IAP1B-SB0009	IAP1B-SB0012	IAP1B-SB0016
Sample No	**PVSB0127**	**PVSB0127D**	**PVSB0133**	**PVSB0136**	**PVSB0139**	**PVSB0148**	**PVSB0160**
Collection Date	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/08/00**	**09/12/00**
Depth (ft)	**1.0-2.5**	**1.0-2.5**	**0.5-1.5**	**1.0-2.0**	**1.1-2.1**	**3.5-5.5**	**4.0-5.0**
Duplicate ID		**PVSB9001**					
Northing	**232773**	**232773**	**232803**	**232774**	**232752**	**232791**	**232764**
Easting	**705191**	**705191**	**705188**	**705229**	**705231**	**705134**	**705245**
2,4,6-Trichlorophenol (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2,4-Dichlorophenol (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2,4-Dimethylphenol (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2,4-Dinitrophenol (ug/kg)	880 U	930 U	950 U	1800 U	1900 U	4900 U	4700 U
2,4-Dinitrotoluene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2,6-Dinitrotoluene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2-Chloronaphthalene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2-Chlorophenol (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2-Fluorobiphenyl (%)						47	75
2-Fluorobiphenyl (ug/kg)	93	94	100	106	101		
2-Fluorophenol (%)						18 *	70
2-Fluorophenol (ug/kg)	101	103	95	112	113		
2-Methylnaphthalene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2-Methylphenol (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
2-Nitroaniline (ug/kg)	880 U	930 U	950 U	1800 U	1900 U	4900 U	4700 U
2-Nitrophenol (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
3,3'-Dichlorobenzidine (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
3-Nitroaniline (ug/kg)	880 U	930 U	950 U	1800 U	1900 U	4900 U	4700 U
4,6-Dinitro-2-methylphenol (ug/kg)	880 U	930 U	950 U	1800 U	1900 U	4900 U	4700 U
4-Bromophenyl-phenylether (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
4-Chloro-3-methylphenol (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
4-Chloroaniline (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
4-Chlorophenyl-phenylether (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
4-Methylphenol (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
4-Nitroaniline (ug/kg)	880 U	930 U	950 U	1800 U	1900 U	4900 U	4700 U
4-Nitrophenol (ug/kg)	880 U	930 U	950 U	1800 U	1900 U	4900 U	4700 U
Acenaphthene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	120 J
Acenaphthylene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Anthracene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Benzo(a)anthracene (ug/kg)	42 J	49 J	51 J	740 U	86 J	180 J	510 J
Benzo(a)pyrene (ug/kg)	40 J	45 J	43 J	740 U	90 J	130 J	180 J
Benzo(b)fluoranthene (ug/kg)	47 J	46 J	51 J	40 J	94 J	140 J	260 J
Benzo(g,h,i)perylene (ug/kg)	31 J	32 J	29 J	39 J	68 J	2000 U	100 J
Benzo(k)fluoranthene (ug/kg)	40 J	53 J	53 J	39 J	89 J	140 J	260 J
Butylbenzylphthalate (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U

Station	IAP1B-SB0005	IAP1B-SB0005	IAP1B-SB0007	IAP1B-SB0008	IAP1B-SB0009	IAP1B-SB0012	IAP1B-SB0016
Sample No	**PVSB0127**	**PVSB0127D**	**PVSB0133**	**PVSB0136**	**PVSB0139**	**PVSB0148**	**PVSB0160**
Collection Date	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/08/00**	**09/12/00**
Depth (ft)	**1.0-2.5**	**1.0-2.5**	**0.5-1.5**	**1.0-2.0**	**1.1-2.1**	**3.5-5.5**	**4.0-5.0**
Duplicate ID		**PVSB9001**					
Northing	**232773**	**232773**	**232803**	**232774**	**232752**	**232791**	**232764**
Easting	**705191**	**705191**	**705188**	**705229**	**705231**	**705134**	**705245**
Carbazole (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Chrysene (ug/kg)	57 J	61 J	72 J	51 J	110 J	200 J	560 J
Di-n-butylphthalate (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Di-n-octyl phthalate (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Dibenz(a,h)anthracene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Dibenzofuran (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Diethylphthalate (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Dimethylphthalate (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Fluoranthene (ug/kg)	82 J	94 J	130 J	44 J	100 J	370 J	1600 J
Fluorene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Hexachlorobenzene (ug/kg)	350 U	370 U	380 U	39 J	41 J	2000 U	1900 U
Hexachlorobutadiene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Hexachlorocyclopentadiene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Hexachloroethane (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Indeno(1,2,3-cd)pyrene (ug/kg)	26 J	29 J	26 J	740 U	61 J	2000 U	98 J
Isophorone (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
N-Nitroso-di-n-propylamine (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
N-Nitrosodiphenylamine (1) (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Naphthalene (ug/kg)	40 J	29 J	100 J	740 U	740 U	2000 U	1900 U
Nitrobenzene (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Pentachlorophenol (ug/kg)	880 U	930 U	950 U	1800 U	1900 U	4900 U	4700 U
Phenanthrene (ug/kg)	53 J	37 J	62 J	740 U	740 U	480 J	110 J
Phenol (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
Pyrene (ug/kg)	68 J	89 J	130 J	43 J	150 J	320 J	1300 J
bis(2-Chloroethoxy)methane (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
bis(2-Chloroethyl)ether (ug/kg)	350 U	370 U	380 U	740 U	740 U	2000 U	1900 U
bis(2-Ethylhexyl)phthalate (ug/kg)	350 U	370 U	380 U	44 J	740 U	2000 U	1900 U
Volatile Organics							
1,1,1-Trichloroethane (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
1,1,2-Trichloroethane (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
1,1-Dichloroethane (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
1,1-Dichloroethene (ug/kg)	19	6	5 U	4 U	5 U	5 U	5 U
1,2-Dichloroethane (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
1,2-Dichloroethene (total) (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U

Station	IAP1B-SB0005	IAP1B-SB0005	IAP1B-SB0007	IAP1B-SB0008	IAP1B-SB0009	IAP1B-SB0012	IAP1B-SB0016
Sample No	**PVSB0127**	**PVSB0127D**	**PVSB0133**	**PVSB0136**	**PVSB0139**	**PVSB0148**	**PVSB0160**
Collection Date	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/07/00**	**09/08/00**	**09/12/00**
Depth (ft)	**1.0-2.5**	**1.0-2.5**	**0.5-1.5**	**1.0-2.0**	**1.1-2.1**	**3.5-5.5**	**4.0-5.0**
Duplicate ID		**PVSB9001**					
Northing	**232773**	**232773**	**232803**	**232774**	**232752**	**232791**	**232764**
Easting	**705191**	**705191**	**705188**	**705229**	**705231**	**705134**	**705245**
1,2-Dichloropropane (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
2-Butanone (ug/kg)	9 U	9 U	10 U	8 U	10 U	10 U	10 U
2-Hexanone (ug/kg)	9 U	9 U	10 U	8 U	10 U	10 U	10 U
4-Methyl-2-pentanone (ug/kg)	9 U	9 U	10 U	8 U	10 U	10 U	10 U
Acetone (ug/kg)	23 U	24 U	6 U	13 U	23 U	48 U	31 U
Benzene (ug/kg)	4 U	5 U	1 J	4 U	5 U	5 U	1 J
Bromodichloromethane (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Bromofluorobenzene (%)						79	76
Bromofluorobenzene (ug/kg)	85	104	60 *	71	106		
Bromoform (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Bromomethane (ug/kg)	9 U	9 U	10 U	8 U	10 U	10 U	10 U
Carbon Disulfide (ug/kg)	2 J	3 J	2 J	2 J	3 J	4 J	2 J
Carbon Tetrachloride (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Chlorobenzene (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Chloroethane (ug/kg)	9 U	9 U	10 U	8 U	10 U	10 U	10 U
Chloroform (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Chloromethane (ug/kg)	9 U	9 U	10 U	8 U	10 U	10 U	10 U
Dibromochloromethane (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Ethylbenzene (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Methylene Chloride (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Styrene (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Tetrachloroethene (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Toluene (ug/kg)	4 U	5 U	1 J	4 U	1 J	5 U	4 J
Trans-1,3-Dichloropropene (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Trichloroethene (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U
Vinyl Chloride (ug/kg)	44	56	10 U	8 U	10 U	10 U	10 U
Xylene (total) (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	1 J
cis-1,3-Dichloropropene (ug/kg)	4 U	5 U	5 U	4 U	5 U	5 U	5 U

Station	IARP-SB0002	IARP-SB0005	IARP-SB0006
Sample No	PVSB0166	PVSB0175	PVSB0178
Collection Date	09/11/00	09/11/00	09/11/00
Depth (ft)	1.5-2.5	0.5-1.5	1.5-2.6
Duplicate ID			
Northing	232700	232688	232691
Easting	705239	705256	705260
Metals			
Aluminum (mg/kg)	9770 J	12000 J	13200 J
Antimony (mg/kg)	0.26 J	0.65 J	0.44 J
Arsenic (mg/kg)	6	16.7	11.2
Barium (mg/kg)	78.5 J	92.5 J	109 J
Beryllium (mg/kg)	0.56 J	0.7 J	0.74 J
Cadmium (mg/kg)	0.03 J	0.07 J	0.03 UJ
Calcium (mg/kg)	3820 J	15200 J	10600 J
Chromium (mg/kg)	12.5 J	28.1 J	33 J
Cobalt (mg/kg)	3.8	14.1	9.2
Copper (mg/kg)	12.9 J	36.8 J	24.9 J
Cyanide (mg/kg)	0.32 U	0.32 U	0.3 U
Iron (mg/kg)	15800 J	32200 J	25400 J
Lead (mg/kg)	11.7 J	23.3 J	23.1 J
Magnesium (mg/kg)	1670 J	7550 J	4550 J
Manganese (mg/kg)	66.1 J	436 J	463 J
Mercury (mg/kg)	0.03 J	0.1 J	0.05 J
Nickel (mg/kg)	11.8 J	33 J	24.4 J
Potassium (mg/kg)	614 J	1580 J	1440 J
Selenium (mg/kg)	0.45 UJ	0.46 J	0.49 J
Silver (mg/kg)	0.12 U	0.12 UJ	0.12 U
Sodium (mg/kg)	172	155	156
Thallium (mg/kg)	0.38 U	0.39 U	0.38 U
Vanadium (mg/kg)	16.1	21	19.4
Zinc (mg/kg)	35.2 J	88 J	77.2 J
PCBs			
Aroclor-1016 (ug/kg)	41 U	37 U	76 U
Aroclor-1221 (ug/kg)	81 U	74 U	150 U
Aroclor-1232 (ug/kg)	41 U	37 U	76 U
Aroclor-1242 (ug/kg)	41 U	37 U	76 U
Aroclor-1248 (ug/kg)	41 U	37 U	76 U
Aroclor-1254 (ug/kg)	41 U	37 U	76 U
Aroclor-1260 (ug/kg)	41 U	37 U	180
Pesticides			
4,4'-DDD (ug/kg)	4.1 U	7.4 U	38 U

Station	IARP-SB0002	IARP-SB0005	IARP-SB0006
Sample No	PVSB0166	PVSB0175	PVSB0178
Collection Date	09/11/00	09/11/00	09/11/00
Depth (ft)	1.5-2.5	0.5-1.5	1.5-2.6
Duplicate ID			
Northing	232700	232688	232691
Easting	705239	705256	705260
4,4'-DDE (ug/kg)	4.1 U	7.4 U	38 U
4,4'-DDT (ug/kg)	4.1 U	7.4 U	38 U
Aldrin (ug/kg)	2 U	3.7 U	19 U
Alpha-BHC (ug/kg)	2 U	3.7 U	19 U
Beta-BHC (ug/kg)	2 U	3.7 U	19 U
Decachlorobiphenyl (%)	75	110	147 *
Delta-BHC (ug/kg)	2 U	3.7 U	19 U
Dieldrin (ug/kg)	4.1 U	7.4 U	38 U
Endosulfan I (ug/kg)	2 U	3.7 U	19 U
Endosulfan II (ug/kg)	4.1 U	7.4 U	38 U
Endosulfan sulfate (ug/kg)	4.1 U	7.4 U	38 U
Endrin (ug/kg)	4.1 U	7.4 U	38 U
Endrin aldehyde (ug/kg)	4.1 U	7.4 U	38 U
Endrin ketone (ug/kg)	4.1 U	7.4 U	38 U
Heptachlor (ug/kg)	2 U	3.7 U	19 U
Heptachlor epoxide (ug/kg)	2 U	3.7 U	19 U
Methoxychlor (ug/kg)	20 U	37 U	190 U
Tetrachloro-m-xylene (%)	35	30	28
Toxaphene (ug/kg)	200 U	370 U	1900 U
alpha-Chlordane (ug/kg)	2 U	3.7 U	19 U
gamma-BHC (Lindane) (ug/kg)	2 U	3.7 U	19 U
gamma-Chlordane (ug/kg)	2 U	3.7 U	19 U
Semivolatile Organics			
1,2,4-Trichlorobenzene (ug/kg)	410 U	1800 U	1900 U
1,2-Dichlorobenzene (ug/kg)	410 U	1800 U	1900 U
1,3-Dichlorobenzene (ug/kg)	410 U	1800 U	1900 U
1,4-Dichlorobenzene (ug/kg)	410 U	1800 U	1900 U
2,2'-oxybis(1-Chloropropane) (ug/kg)	410 U	1800 U	1900 U
2,4,5-Trichlorophenol (ug/kg)	1000 U	4600 U	4800 U
2,4,6-Tribromophenol (%)	42	51	51
2,4,6-Trichlorophenol (ug/kg)	410 U	1800 U	1900 U
2,4-Dichlorophenol (ug/kg)	410 U	1800 U	1900 U
2,4-Dimethylphenol (ug/kg)	410 U	1800 U	1900 U
2,4-Dinitrophenol (ug/kg)	1000 U	4600 U	4800 U
2,4-Dinitrotoluene (ug/kg)	410 U	1800 U	1900 U

Station	**IARP-SB0002**	**IARP-SB0005**	**IARP-SB0006**
Sample No	**PVSB0166**	**PVSB0175**	**PVSB0178**
Collection Date	**09/11/00**	**09/11/00**	**09/11/00**
Depth (ft)	**1.5-2.5**	**0.5-1.5**	**1.5-2.6**
Duplicate ID			
Northing	**232700**	**232688**	**232691**
Easting	**705239**	**705256**	**705260**
2,6-Dinitrotoluene (ug/kg)	410 U	1800 U	1900 U
2-Chloronaphthalene (ug/kg)	410 U	1800 U	1900 U
2-Chlorophenol (ug/kg)	410 U	1800 U	1900 U
2-Fluorobiphenyl (%)	38	59	58
2-Fluorophenol (%)	47	65	63
2-Methylnaphthalene (ug/kg)	410 U	1800 U	1900 U
2-Methylphenol (ug/kg)	410 U	1800 U	1900 U
2-Nitroaniline (ug/kg)	1000 U	4600 U	4800 U
2-Nitrophenol (ug/kg)	410 U	1800 U	1900 U
3,3'-Dichlorobenzidine (ug/kg)	410 U	1800 U	1900 U
3-Nitroaniline (ug/kg)	1000 U	4600 U	4800 U
4,6-Dinitro-2-methylphenol (ug/kg)	1000 U	4600 U	4800 U
4-Bromophenyl-phenylether (ug/kg)	410 U	1800 U	1900 U
4-Chloro-3-methylphenol (ug/kg)	410 U	1800 U	1900 U
4-Chloroaniline (ug/kg)	410 U	1800 U	1900 U
4-Chlorophenyl-phenylether (ug/kg)	410 U	1800 U	1900 U
4-Methylphenol (ug/kg)	410 U	1800 U	1900 U
4-Nitroaniline (ug/kg)	1000 U	4600 U	4800 U
4-Nitrophenol (ug/kg)	1000 U	4600 U	4800 U
Acenaphthene (ug/kg)	410 U	1800 U	1900 U
Acenaphthylene (ug/kg)	410 U	1800 U	1900 U
Anthracene (ug/kg)	410 U	1800 U	1900 U
Benzo(a)anthracene (ug/kg)	410 U	1800 U	220 J
Benzo(a)pyrene (ug/kg)	410 U	93 J	200 J
Benzo(b)fluoranthene (ug/kg)	410 U	130 J	300 J
Benzo(g,h,i)perylene (ug/kg)	410 U	1800 U	150 J
Benzo(k)fluoranthene (ug/kg)	410 U	1800 U	240 J
Butylbenzylphthalate (ug/kg)	410 U	1800 U	1900 U
Carbazole (ug/kg)	410 U	1800 U	1900 U
Chrysene (ug/kg)	410 U	140 J	320 J
Di-n-butylphthalate (ug/kg)	410 U	1800 U	1900 U
Di-n-octyl phthalate (ug/kg)	410 U	1800 U	1900 U
Dibenz(a,h)anthracene (ug/kg)	410 U	1800 U	1900 U
Dibenzofuran (ug/kg)	410 U	1800 U	1900 U
Diethylphthalate (ug/kg)	410 U	1800 U	1900 U

Station	IARP-SB0002	IARP-SB0005	IARP-SB0006
Sample No	**PVSB0166**	**PVSB0175**	**PVSB0178**
Collection Date	**09/11/00**	**09/11/00**	**09/11/00**
Depth (ft)	**1.5-2.5**	**0.5-1.5**	**1.5-2.6**
Duplicate ID			
Northing	**232700**	**232688**	**232691**
Easting	**705239**	**705256**	**705260**
Dimethylphthalate (ug/kg)	410 U	1800 U	1900 U
Fluoranthene (ug/kg)	410 U	130 J	450 J
Fluorene (ug/kg)	410 U	1800 U	1900 U
Hexachlorobenzene (ug/kg)	410 U	1800 U	1900 U
Hexachlorobutadiene (ug/kg)	410 U	1800 U	1900 U
Hexachlorocyclopentadiene (ug/kg)	410 U	1800 U	1900 U
Hexachloroethane (ug/kg)	410 U	1800 U	1900 U
Indeno(1,2,3-cd)pyrene (ug/kg)	410 U	1800 U	150 J
Isophorone (ug/kg)	410 U	1800 U	1900 U
N-Nitroso-di-n-propylamine (ug/kg)	410 U	1800 U	1900 U
N-Nitrosodiphenylamine (1) (ug/kg)	410 U	1800 U	1900 U
Naphthalene (ug/kg)	410 U	1800 U	1900 U
Nitrobenzene (ug/kg)	410 U	1800 U	1900 U
Pentachlorophenol (ug/kg)	1000 U	4600 U	4800 U
Phenanthrene (ug/kg)	410 U	1800 U	200 J
Phenol (ug/kg)	410 U	1800 U	1900 U
Pyrene (ug/kg)	410 U	190 J	480 J
bis(2-Chloroethoxy)methane (ug/kg)	410 U	1800 U	1900 U
bis(2-Chloroethyl)ether (ug/kg)	410 U	1800 U	1900 U
bis(2-Ethylhexyl)phthalate (ug/kg)	410 U	1800 U	1900 U
Volatile Organics			
1,1,1-Trichloroethane (ug/kg)	5 U	6 U	6 U
1,1,2,2-Tetrachloroethane (ug/kg)	5 U	6 U	6 U
1,1,2-Trichloroethane (ug/kg)	5 U	6 U	6 U
1,1-Dichloroethane (ug/kg)	5 U	6 U	6 U
1,1-Dichloroethene (ug/kg)	5 U	6 U	6 U
1,2-Dichloroethane (ug/kg)	5 U	6 U	6 U
1,2-Dichloroethene (total) (ug/kg)	5 U	6 U	6 U
1,2-Dichloropropane (ug/kg)	5 U	6 U	6 U
2-Butanone (ug/kg)	10 U	11 U	11 U
2-Hexanone (ug/kg)	10 U	11 U	11 U
4-Methyl-2-pentanone (ug/kg)	10 U	11 U	11 U
Acetone (ug/kg)	22 U	67 U	23 U
Benzene (ug/kg)	5 U	6 U	6 U
Bromodichloromethane (ug/kg)	5 U	6 U	6 U

Station	IARP-SB0002	IARP-SB0005	IARP-SB0006
Sample No	PVSB0166	PVSB0175	PVSB0178
Collection Date	09/11/00	09/11/00	09/11/00
Depth (ft)	1.5-2.5	0.5-1.5	1.5-2.6
Duplicate ID			
Northing	232700	232688	232691
Easting	705239	705256	705260
Bromofluorobenzene (%)	81	88	60 *
Bromoform (ug/kg)	5 U	6 U	6 U
Bromomethane (ug/kg)	10 U	11 U	11 U
Carbon Disulfide (ug/kg)	5 U	6 U	2 J
Carbon Tetrachloride (ug/kg)	5 U	6 U	6 U
Chlorobenzene (ug/kg)	5 U	6 U	6 U
Chloroethane (ug/kg)	10 U	11 U	11 U
Chloroform (ug/kg)	5 U	6 U	6 U
Chloromethane (ug/kg)	10 U	11 U	11 U
Dibromochloromethane (ug/kg)	5 U	6 U	6 U
Ethylbenzene (ug/kg)	5 U	6 U	6 U
Methylene Chloride (ug/kg)	5 U	6 U	6 U
Styrene (ug/kg)	5 U	6 U	6 U
Tetrachloroethene (ug/kg)	5 U	6 U	6 U
Toluene (ug/kg)	5 U	6 U	2 J
Trans-1,3-Dichloropropene (ug/kg)	5 U	6 U	6 U
Trichloroethene (ug/kg)	5 U	6 U	6 U
Vinyl Chloride (ug/kg)	10 U	11 U	11 U
Xylene (total) (ug/kg)	5 U	6 U	6 U
cis-1,3-Dichloropropene (ug/kg)	5 U	6 U	6 U

APPENDIX H

Cost Estimates for Remedial Options

Painesville FUSRAP Site RI/FS

Alternative 2 - Asphaltic Concrete Cap In Place

Project No. 4191-120

Designed By:

SAIC - Columbus, Ohio

Estimated By:

Mike Poligone

Prepared By: Mike Poligone

Preparation Date: 07/01/2002

Effective Date of Pricing: 07/01/2002

Est Construction Time: 65 Days

This cost estimate is for Alternative No. 2 for the Painesville FUSRAP Site in Painesville, Ohio. This alternative is described in the Painesville Site Feasibility Study.

Under this alternative, impacted soil exceeding the preliminary remediation goals of a Subsistence Farmer will be covered in place with a one-foot thick asphaltic concrete cap to reduce potential exposure. The estimated surface area of the affected areas designated for covering is 110,000 square feet (06/26/02). Includes a 5-ft buffer on all sides and an additional 20% to account for irregular areas.

Tasks associated with Alternative 2 include: a) preparation of design specifications and plans for the cover system; b) preparation of the existing surface for cover system placement; c) placement of the asphaltic concrete cover system over the designated areas; d) environmental monitoring; e) maintenance of the capped areas, f) annual inspections; and g) 5-year records review and report submittal of the capping system for a 30-year period.

For costing purposes, work associated with capping activities will be performed in Level D personnel protective equipment (PPE) unless otherwise noted.

PAINESVILLE SITE KEY PARAMETERS:

Contaminated Site Soil Volumes - Subsistence Farmer
In Situ LLW Soil Volume = 3,750 cy (1)

Asphalt Cover Area - Subsistence Farmer
In Situ LLW Cover Area = 110,000 sf (2)

Controlled Area Perimeter - Subsistence Farmer
Controlled Area Perimeter = 3,600 lf (3)

Available construction weeks(mos.) per year --- 40 (9 mos)
Available construction days/month --- --- --- 22
Available construction hours/day --- --- --- 8

1. Volumes are based on SAIC Earthvision 3D Model
2. Includes a 5 ft buffer on all sides. An additional 20% was included to account for irregular areas.
3. Includes a 10 ft buffer on all sides. An additional 20% was included to account for irregular areas.

PROJECT SCHEDULE SUMMARY:

The estimated start date for field activities under this alternative is March 2003. The project schedule is based on 8 hours per day and 5 days per week.

Engineering Design = 0.5 to 1 year

Remedial Action = 65 days or 13 weeks or 3 months
Mobilization and Preparatory Activities = 5 days
Place Cap = 55 days
Demobilization = 5 days

Post RA Reports and As-builts = 0.5 years

O&M Period 1,000 years

ESCALATION:

The purpose of this cost estimate is to evaluate multiple alternatives proposed for remediating the Painesville Site. This estimate is not intended for construction purposes. Therefore, the base year of comparison will be CY2002 and escalation will only be applied to cost data used in this estimate prior to CY2002. If prices are required to be escalated, the escalation determinations will be made using the Tri-Service Military Construction Program (MCP) Indexes based on DOD Comptroller Revised Inflation Guidance memorandum.

OTHER PROJECT COSTS

The following overhead markups were applied to the direct cost elements as follows:

(1) Field Overhead - A 15% field overhead markup was applied to the direct project cost to account for all general conditions (i.e. Mobilization and Demobilization cost) including field supervision of labor. This overhead item also includes submittals, training, and miscellaneous ODC items required for the project.

(2) Office Overhead - A 5% office overhead markup has been applied for engineering and technical support during construction and after construction.

(3) Profit - An 8% markup for profit was applied to the direct project cost.

(4) Professional Labor - A 140% markup was applied to all professional labor for fringes and overhead.

PROJECT AND CONSTRUCTION MANAGEMENT:

Project and Construction Management are included as direct cost in the estimate, therefore no separate markup is included for these tasks. FUSRAP Management and Integration costs have not been incorporated into the estimate.

DESIGN COSTS:

Remedial Design associated with the design and preparation of project plans, specifications, and post RA documents has been assumed to be 8% of the total remedial action costs.

CONTINGENCY:

Contingencies are shown for both Design Contingencies and Construction Contingencies. EPA Guidance 540-R-00-002, July 2000 was used as a reference in developing design and construction contingencies.

A design contingency of 15% is being applied due to the proven implementation of these technologies. Capping has been successfully implemented at other superfund sites however the design details (cleanup criteria, thickness, cost and availability of materials) of the cover materials have not been completed.

A construction contingency of 10% is being applied due to the potential for increases in soil volumes that have been common at other FUSRAP sites. This would also include cost overruns, modifications, and change orders.

4191-120 Alternative 2 - Asphaltic Concrete Cap In Place

	Quantity		Unit Cost	Total Cost	
Painesville Site - Alt. 2 - Cap in Place					
3 Remedial Action, Site Supervisory, and Home Office					
1 Placement of Asphalt Cap					
2 Site Development	110,000	SF	0.71	78,245	
06 Asphaltic Concrete Cover System	110,000	SF	12.39	1,362,692	
SUBTOTAL Placement of Asphalt Cap	110,000	SF	13.10	1,440,937	65%
10 Rad Monitoring Program					
02 Monitoring,Sampling,Testing, & Analysis	110,000	SF	0.88	96,555	
SUBTOTAL Rad Monitoring Program	110,000	SF	0.88	96,555	4%
01 Land Use Controls					
0801 Long Term Management Plan and Site Database				109,752	
0802 Land Use Controls				15,479	
SUBTOTAL Land Use Controls	110,000	SF	1.14	125,230	6%
20 Site Supervisory Labor					
01 Reserved - Site Project Labor	110,000	SF	2.49	273,627	
SUBTOTAL Site Supervisory Labor	110,000	SF	2.49	273,627	12%
10 Home Office Support					
01 RA Home Office Support				280,520	
SUBTOTAL Home Office Support	110,000	SF	2.55	280,520	13%
SUBTOTAL Remedial Action, Site Supervisory, and Home Office	110,000	SF	20.15	2,216,870	7%
15 Operations and Maintenance					
10 Inspection					
10 Site Inspection	1,000	YR	8,078.74	8,078,743	
15 Well Sampling	6	EA	238,024.33	1,428,146	
20 Gamma Survey	200	EA	8,802.68	1,760,535	
SUBTOTAL Inspection	1,000	YR	11,267.42	11,267,424	41%
01 Land Use Controls					
0801 Long Term Management Plan and Site Database	1,000	YR	10,328.00	10,328,003	
SUBTOTAL Land Use Controls	1,000	YR	10,328.00	10,328,003	37%
20 Five Year Review					
5 File Review	200	EA	2,294.75	458,950	
10 Report Preparation	200	EA	9,245.91	1,849,181	
SUBTOTAL Five Year Review	1,000	YR	2,308.13	2,308,132	8%
30 Maintenance					
08 Fence Repair	50,000	LF	61.62	3,080,936	
12 Warning Signs	31,400	EA	9.32	292,742	
Asphalt Cover Repair	1,000	YR	528.16	528,161	
SUBTOTAL Maintenance	1,000	YR	3,901.84	3,901,839	14%
SUBTOTAL Operations and Maintenance	1,000	YR	27,805.40	27,805,397	93%

	Quantity		Unit Cost	Total Cost	
SUBTOTAL Painesville Site - Alt. 2 - Cap in Place	110,000	SF	272.93	30,022,267	100%
Alternative 2 - Asphaltic Concrete Cap In Place	**110,000**	**SF**	**272.93**	**30,022,267**	

		Quantity		Unit Cost	Total Cost

4191-120 Alternative 2 - Asphaltic Concrete Cap In Place

Painesville Site - Alt. 2 - Cap in Place

3 Remedial Action, Site Supervisory, and Home Office

1 Placement of Asphalt Cap

2 Site Development

This element represents required preliminary site activities and includes erosion control, surveying, surface preparation, and mobilization costs.

20 Mob/Demob

For mob and demob of 5 pieces of equipment (assumes 1 grader, 1 loader, 1 compactor, 1 dozer, 1 asphalt placement)

		Quantity		Unit Cost	Total Cost
023052500100	Mobil Or Demobil, Dozer, Lder, Backhoe Or Exc, Above 250 H.P.	10.00	EA	270.00	2,700
	SUBTOTAL Mob/Demob	**110,000**	**SF**	**0.02**	**2,700**

1 Temporary Fencing and Erosion Control

This element represents costs associated with the implementation of temporary fencing and erosion and sediment control measures prior to the implementation of the remedial activity. Total Area = 110,000 sf. The total perimeter with a 10 ft buffer is 3,600 lf.

		Quantity		Unit Cost	Total Cost
023705501000	Erosion Control, Silt Fence, Polypropylene, 3' High, Ideal Conditions	3,600.00	LF	0.69	2,484
028205287001	Fence, Misc Metal, Snow Fence On Steel Posts 10' Oc, 4' High	3,600.00	LF	3.60	12,960
	SUBTOTAL Temporary Fencing and Erosion Control	**110,000**	**SF**	**0.14**	**15,444**

3 Surveying

Costs associated with land surveying activities, including initial survey, limit of work layout, as-built surveys, and final survey and plan development.

10 Initial Survey

3 man crew for 1 day to establish a baseline plan of existing conditions and site features. Assume 24 hours for plan development.

		Quantity		Unit Cost	Total Cost
011077001200	Surveying, Crew For Building Layout, 3 Person Crew	1.00	DAY	1,943.60	1,944
33220106	Plan Development - Staff Engineer	24.00	HR	54.31	1,303
	SUBTOTAL Initial Survey	**1**	**LS**		**3,247**

20 Establish Site Control/Layout

Assume 3 man crew for 1 day to establish the layout of the cover system.

		Quantity		Unit Cost	Total Cost
011077001200	Surveying, Crew For Building Layout, 3 Person Crew	1.00	DAY	1,943.60	1,944
33220106	Plan Development - Staff Engineer	24.00	HR	54.31	1,303
	SUBTOTAL Establish Site Control/Layout	**1**	**LS**		**3,247**

30 Reestablish Site Control/Layout

Assume 10 visits at 0.5 days each to reestablish the layout of the cover system.

		Quantity		Unit Cost	Total Cost
011077001200	Surveying, Crew For Building Layout, 3 Person Crew	5.00	DAY	1,943.60	9,718
	SUBTOTAL Reestablish Site Control/Layout	**1**	**LS**		**9,718**
	40 As-built and Final Surveys				
	3 man crew for 1.5 days during the remedial action phase to perform as-built surveys and to conduct a final construction survey. Includes final construction plan development.				
011077001200	Surveying, Crew For Building Layout, 3 Person Crew	1.50	DAY	1,943.60	2,915
33220106	Plan Development - Staff Engineer	40.00	HR	54.31	2,172
	SUBTOTAL As-built and Final Surveys	**1**	**LS**		**5,088**
	SUBTOTAL Surveying	**110,000**	**SF**	**0.19**	**21,300**
	30 Decontamination Allowance				
Task00128	Decontamination Pad Allowance	1.00	EA	5,000.00	5,000
	SUBTOTAL Decontamination Allowance	**110,000**	**SF**	**0.05**	**5,000**
	SUBTOTAL Site Development	**110,000**	**SF**	**0.40**	**44,444**
	06 Asphaltic Concrete Cover System				
	Line item represents costs associated sitework for the placement of a 1 ft thick asphaltic concrete cover over affected areas. Assumes surfaces will require rough grading for mounds/depressions/asphalt. Compact existing grade to mitigate settlement. Place geotextile as separation layer. Place and compact 6 in gravel layer. Place 12 in asphalt layer.				
17030101	Rough Grading, Dozer	24,478.00	SY	0.84	20,562
17030107	Fine Grading, Dozer	24,478.00	SY	0.24	5,875
17010501	Compact Subgrade, 2 Lifts	2,040.00	CY	0.54	1,102
33080535	16 oz/sy Geotextile/Drainage Fabric (170 Mil)	27,849.00	SY	3.00	83,547
17030510	Dry Roll Gravel, Steel Roller	12,239.00	SY	0.94	11,505
18010102	Gravel, Delivered & Dumped	2,040.00	CY	29.52	60,221
18010310	Prime Coat	12,239.00	SY	0.49	5,997
18010312	Asphalt Wearing Course, 1 Pass (Line Item Includes 5% waste)	7,986.00	TON	73.28	585,214
	SUBTOTAL Asphaltic Concrete Cover System	**110,000**	**SF**	**7.04**	**774,021**
	SUBTOTAL Placement of Asphalt Cap	**110,000**	**SF**	**7.44**	**818,465**

10 Rad Monitoring Program

02 Monitoring,Sampling,Testing, & Analysis

		Quantity		Unit Cost	Total Cost

4 Rad Technician

Includes monitoring, sampling and analysis, verification, and decontamination confirmation testing. Assume one rad technician for the duration of the project. Minimal rad monitoring will be required for placement of the cap.

This WBS covers IH/HP technicians for 3 months = 520 hrs.

Equipment pricing base on Vendor Quote (SEC 2/2001;Rates escalated to 2/2002)- The monitoring equipment includes the following:

1. Model 2929 dual channel scaler (1 @ $365/mo =$365/mo)
2. Ratemeter w/GM pancake, 44-9 or equal (1 @ $195/mo = $195/mo)
3. Alarming Frisker w/ GM pancake, 44-9 or equal (1 @ $133/mo = $133/mo)
5. Personal Air Sampling pumps (2 @ $83/mo = $166/mo)
7. Personal air sampling pump charger (2 @ $52/mo = $104/mo)
8. Low Volume air samplers (2 @ $102/mo = $204/mo)

Total = $1,167/month. Use $1,500/mo direct cost to account for other miscellaneous equipment or supplies.

		Quantity		Unit Cost	Total Cost
33021498	IH/HP Technicians	520.00	HR	35.84	18,637
ENGREST	IH/HP Technician, 1 pers. (Travel premium)	520.00	HR	27.13	14,108
Vendor Quote	IH/HP Monitoring Equipment	3.00	MO	1,500.00	4,500
	SUBTOTAL Rad Technician	**1**	**LS**		**37,244**
	04 Rad Analytical Urine/Feces				
33022307	Bioassays (2/ea x 10 people)	20.00	EA	130.00	2,600
	SUBTOTAL Rad Analytical Urine/Feces				**2,600**
	05 Rad Analytical Soils				

Includes 50 miscellaneous samples to verify contaminated areas have been covered.

		Quantity		Unit Cost	Total Cost
ENGREST	Rad and Chemical Analysis	50.00	EA	300.00	15,000
	SUBTOTAL Rad Analytical Soils				**15,000**
	SUBTOTAL Monitoring,Sampling,Testing, & Analysis	**110,000**	**SF**	**0.50**	**54,844**
	SUBTOTAL Rad Monitoring Program	**110,000**	**SF**	**0.50**	**54,844**

01 Land Use Controls

0801 Long Term Management Plan and Site Database

Develop Long Term Management Plan to address administrative or legal measures to reduce or minimize potential exposures to contaminants left on site.

Long Term Management Plan - Assume 400 hrs to research controls, coordinate with stakeholders, and develop plan. Use Senior PM Rate.

Site Information Database - Assume 200 hrs to develop a site database. Use Senior Engineer Rate

		Quantity		Unit Cost	Total Cost
33220101	Long Term Management Plan	400.00	HR	109.90	43,960
33220104	Site Database	200.00	HR	91.90	18,380
	SUBTOTAL Long Term Management Plan and Site Datab	**1**	**EA**		**62,340**

		Quantity		Unit Cost	Total Cost
0802 Land Use Controls					
Implement Land Use Controls - Assume 160 hours to implement land use controls. Use Senior PM Rate.					
33220101	Implement Land Use Controls	80.00	HR	109.90	8,792
SUBTOTAL Land Use Controls		**1**	**EA**		**8,792**
SUBTOTAL Land Use Controls		**110,000**	**SF**	**0.65**	**71,132**

20 Site Supervisory Labor

Line item represents labor costs for site supervisory personnel such as site superintendent, SHSO, QA/QC, officer, and field monitoring technicians to be provided by the Contractor.

01 Reserved - Site Project Labor

Total hours of on-site construction: 65 days x 8 hrs/day = 520 hours

Assume a 2.4 multiplier for all professional labor to include overhead and fringes.

Travel Premium = 85 for meals and lodging/day, 45 for rental car/day, and 15/day for monthly trip, and 10/day for misc. = $155/day

$155/day x 7 days/week / 40 hours/week = $27.13

		Quantity		Unit Cost	Total Cost
1 Site Superintendent					
99110203	Site Superintendent (Hourly Labor Rate)	520.00	HR	81.12	42,182
ENGREST	Site Superintendent (Hourly Travel Premium)	520.00	HR	27.13	14,108
SUBTOTAL Site Superintendent		**1**	**LS**		**56,290**
2 SSHO					
99110703	SSHO, 1 pers. (Hourly Labor Rate)	520.00	HR	83.28	43,306
ENGREST	SSHO, 1 pers. (Hourly Travel Premium)	520.00	HR	27.13	14,108
SUBTOTAL SSHO		**1**	**LS**		**57,413**
Field Engineer					
99110403	Field Engineer (Hourly Labor Rate)	520.00	HR	53.10	27,612
ENGREST	Field Engineer, (Hourly Travel Premium)	520.00	HR	27.13	14,108
SUBTOTAL Field Engineer		**1**	**LS**		**41,720**
SUBTOTAL Reserved - Site Project Labor		**110,000**	**SF**	**1.41**	**155,423**
SUBTOTAL Site Supervisory Labor		**110,000**	**SF**	**1.41**	**155,423**

10 Home Office Support

		Quantity		Unit Cost	Total Cost

01 RA Home Office Support

Travel cost assumes 3 trips each person for 3 days.

Travel Premium = 85 for meals and lodging/day, 45 for rental car/day, and 200 for trip, and 10 for misc.
= $340/day

$340/day/ 8 hours/day = $42.50/hr.

FTE = 176 hours/mo

176 hrs/mo x 3 mos. = 528 hours (Full time FTE)
88 hrs/mo x 3 mos. = 264 hours (0.5 FTE)
44 hrs./mo x 3 mos. = 132 hours (0.25 FTE)

		Quantity		Unit Cost	Total Cost
33220101	Senior Manager (Hourly Labor Rate)	264.00	HR	109.90	29,014
ENGREST	Senior Manager (Hourly Travel Premium)	72.00	HR	42.50	3,060
33220104	Senior Engineer (Hourly Labor Rate)	528.00	HR	91.90	48,523
ENGREST	Senior Engineer (Hourly Travel Premium)	72.00	HR	42.50	3,060
33220106	Prjt. Control/Scheduler (Hourly Labor Rate)	264.00	HR	54.31	14,338
ENGREST	Prjt. Control/Scheduler (Hourly Travel Premium)	72.00	HR	42.50	3,060
33220110	Attorney/QA/H&S (Hourly Labor Rate)	264.00	HR	120.48	31,807
ENGREST	Attorney/QA/H&S (Hourly Travel Premium)	72.00	HR	42.50	3,060
33220106	Community Relations (Hourly Labor Rate)	264.00	HR	54.31	14,338
33220113	Finance/Purchasing (Hourly Labor Rate)	132.00	HR	34.39	4,539
33220113	Admin/Data Mgmnt. (Hourly Labor Rate)	132.00	HR	34.39	4,539
SUBTOTAL RA Home Office Support		**1**	**LS**		**159,338**
SUBTOTAL Home Office Support		**110,000**	**SF**	**1.45**	**159,338**
SUBTOTAL Remedial Action, Site Supervisory, and Hom		**110,000**	**SF**	**11.45**	**1,259,203**

15 Operations and Maintenance

This element defines Operations and Maintenance requirements for the native soil cover system. Components include the following:

1) Annual site inspection and monitoring,
2) Annual well sampling,
3) Annual gamma survey
4) 5-Year Status Report.
5) Fence and sign maintenance,

O&M costs will be performed for a 1,000 year period.

10 Inspection

This element describes costs associated with an annual inspection program of the capped area.

10 Site Inspection

Assume two field engineers @ 24 hours each per year for site inspection and follow up report for 1,000 years.

2 Field Engineers x 24 hrs/event x 1,000 events = 48,000 hrs.

		Quantity		Unit Cost	Total Cost
99110403	Field Engineer, 2 pers. (Hourly Labor Rate) Assumes 50% on-site during project duration x 2 men	48,000.00	HR	53.10	2,548,800
ENGREST	Field Engineer, 2 pers. (Hourly Travel Premium)	48,000.00	HR	42.50	2,040,000
	SUBTOTAL Site Inspection	**1,000**	**YR**	**4,588.80**	**4,588,800**

15 Well Sampling

Assumes sampling of 4 wells on a five-year basis with analysis for Rad COCs.

6 samples/event x 200 events = 1,200 samples.

2 technicians @ 16 hrs per event x 200 events = 6,400 hrs.

		Quantity		Unit Cost	Total Cost
33029906	Subcontracted Sampling (each person)	6,400.00	HR	70.50	451,200
Task02492	Rad and Chemical Analysis	1,200.00	EA	300.00	360,000
	SUBTOTAL Well Sampling	**6**	**EA**	**135,200.00**	**811,200**

20 Gamma Survey

Assumes $5,000 allowance to perform a gamma survey/ 5-year period for 1,000 year O&M period.

		Quantity		Unit Cost	Total Cost
ENGREST	Gamma Survey	200.00	EA	5,000.00	1,000,000
	SUBTOTAL Gamma Survey	**200**	**EA**	**5,000.00**	**1,000,000**
	SUBTOTAL Inspection	**1,000**	**YR**	**6,400.00**	**6,400,000**

01 Land Use Controls

0801 Long Term Management Plan and Site Database

Maintain O&M plan to address administrative or legal measures to reduce or minimize potential for exposure to contaminants left on site. Maintain Cap for 1,000 year duration due to long half life of radioactive constituents. Assume the following:

Long Term Management Plan - Assume 40 hrs/yr for 1,000 yrs = 40,000 hrs to coordinate with stakeholders and make revisions to plan. Use Senior PM Rate.

Site Information Database - Assume 16 hrs/yr for 1,000 yrs = 16,000 hrs to update site database. Use Senior Engineer Rate.

		Quantity		Unit Cost	Total Cost
33220101	Long Term Management Plan	40,000.00	HR	109.90	4,396,000
33220104	Site Database	16,000.00	HR	91.90	1,470,400
	SUBTOTAL Long Term Management Plan and Site Datab	**1,000**	**YR**	**5,866.40**	**5,866,400**
	SUBTOTAL Land Use Controls	**1,000**	**YR**	**5,866.40**	**5,866,400**

20 Five Year Review

5-year status summary report for the following:

Annual Inspection results and review of state/federal files.
There will be a total of 200 reports generated over the 1,000 -year period.

Assumes 3 days for each file review.

5 File Review

		Quantity		Unit Cost	Total Cost
33220106	Staff Engineer	4,800.00	HR	54.31	260,688
	SUBTOTAL File Review	**200**	**EA**	**1,303.44**	**260,688**
	10 Report Preparation				
33220104	Senior Engineer (16 hrs each)	3,200.00	HR	91.90	294,080
33220106	Staff Engineer (24 hrs each)	4,800.00	HR	54.31	260,688
33220110	Attorney (16 hrs each)	3,200.00	HR	120.48	385,536
33220113	Admin/Data Mgmnt. (16 hrs each)	3,200.00	HR	34.39	110,048
	SUBTOTAL Report Preparation	**200**	**EA**	**5,251.76**	**1,050,352**
	SUBTOTAL Five Year Review	**1,000**	**YR**	**1,311.04**	**1,311,040**
	30 Maintenance				
	08 Fence Repair				
	Repair fence over 1,000 year period. Assume 50 ft/year over 31,000 years = 50,000 lf.				
Task00074	Fence Repair Allowance	50,000.00	LF	35.00	1,750,000
	SUBTOTAL Fence Repair	**50,000**	**LF**	**35.00**	**1,750,000**
	12 Warning Signs				
	Assume 10 signs for each of the 7 areas = 70				
	Assume 0.25 hours to install for 2 laborers = 18 hours each.				
	Replace every 50 years = 70 signs x 20 events = 1,400 and 36 hrs x 20 events = 720 hrs.				
028907000400	Signs, Stock, 30" X 30", High Intensity	1,400.00	EA	100.00	140,000
CLAB	Common Building Laborers	720.00	HR	36.50	26,280
	SUBTOTAL Warning Signs	**31,400**	**EA**	**5.30**	**166,280**
	Asphalt Cover Repair				
	Assume a $10,000/year allowance for maintenance of asphalt cap.				
ENGREST	Asphalt Cover Repair	30.00	YR	10,000.00	300,000
	SUBTOTAL Asphalt Cover Repair	**1,000**	**YR**	**300.00**	**300,000**
	SUBTOTAL Maintenance	**1,000**	**YR**	**2,216.28**	**2,216,280**
	SUBTOTAL Operations and Maintenance	**1,000**	**YR**	**15,793.72**	**15,793,720**
	SUBTOTAL Painesville Site - Alt. 2 - Cap in Place	**110,000**	**SF**	**155.03**	**17,052,923**
	SUBTOTAL	*110,000*	*SF*	*155.03*	*17,052,923*
	Field Overhead - Prime Contractor - AA	15.0%		23.25	2,557,938
	Home Office Overhead - Prime Contractor - AA	5.0%		8.91	980,543
	Profit - Prime Contractor - AA	8.0%		14.98	1,647,312

	Quantity	Unit Cost	Total Cost
SUBTOTAL	*110,000 SF*	*202.17*	*22,238,717*
Remedial Design	8.0%	16.17	1,779,097
Contingencies	25.0%	54.59	6,004,453
Alternative 2 - Asphaltic Concrete Cap In Place	**110,000 SF**	**272.93**	**30,022,267**

Alternative 3-Subsistence Farmer Removal Criteria and Offsite Disposal

Project No. 4191-120

Designed By:

SAIC - Columbus, Ohio

Estimated By:

Mike Poligone

Prepared By: Mike Poligone
Preparation Date: 07/01/2002

Effective Date of Pricing: 07/01/2002
Est Construction Time: 90 Days

CostLink CM Report	Page Number
Project Notes	1
Level 4 Owner Cost Summary	3
Estimate Detail	4

This cost estimate is for Alternative 3 the Subsistence Farmer Scenario for the Painesville FUSRAP Site in Painesville, Ohio. This alternative is described in the Painesville Site Feasibility Study.

Under this scenario, impacted soil exceeding the preliminary remediation goals for a subsistence farmer will be excavated and transported off-site for disposal at an approved commercial facility permitted or licensed to accept the material.

Tasks associated with the scenario include: a) preparation of design specifications and plans; b) excavation of contaminated soils ; c) transportation and off-site disposal of the material d) backfill of excavated areas; and e) environmental monitoring.

PAINESVILLE SITE KEY PARAMETERS:

Contaminated Site Soil Volumes - Subsistence Farmer
In Situ LLW Soil Volume = 3,750 cy
LLW Soil w/ 30% overexcavation = 4,900 cy
LLW Excav w/ 25% expansion (ex situ) = 6,100 cy

Overexcavation Factor --- --- --- --- --- 1.30
Expansion Factor --- --- --- --- --- 1.25
Available construction weeks(mos.) per year --- 40 (9 mos)
Available construction days/month --- --- --- 22
Available construction hours/day --- --- --- 8

1. Volumes are based on SAIC Earthvision 3D Model
2. In situ excavation volumes include a 30% increase to account for overexcavation.
3. Ex situ excavation volumes include a 25% increase to account for expansion of soil (swell factor).

PROJECT SCHEDULE SUMMARY:

The estimated start date for field activities under this alternative is March, 2003. The project schedule is based on 8 hours per day and 5 days per week.

Engineering Design = 0.5 to 1 year

Remedial Action = 90 days or 18 weeks or 4.1 months

Mobilization and Preparatory Activities = 5 days
Excavation Activities = 60 days
Verification and Hot Spot Removal = 15 days
Restoration and Decon Activities = 5 days
Demob = 5 days

Post RA Reports and As-builts = 0.5 to 1 year

ESCALATION:

The purpose of this cost estimate is to evaluate multiple alternatives proposed for remediating the Painesville Site. This estimate is not intended for construction purposes. Therefore, the base year of comparison will be CY2002 and escalation will only be applied to cost data used in this estimate prior to CY2002. If prices are required to be escalated, the escalation determinations will be made using the Tri-Service Military Construction Program (MCP) Indexes based on DOD Comptroller Revised Inflation Guidance memorandum.

OTHER PROJECT COSTS

Two overhead markups were applied to the direct cost elements as follows:

(1) Field Overhead - A 15% field overhead markup was applied to the direct project cost to account for all general conditions (i.e. Mobilization and Demobilization cost) including field supervision of labor. This overhead item also includes submittals, training, and miscellaneous ODC items required for the project.

(2) Office Overhead - A 5% office overhead markup has been applied for engineering and technical support during construction and after construction.

(3) Profit - An 8% markup for profit was applied to the direct project cost.

(4) Professional Labor - A 140% markup was applied to all professional labor for fringes and overhead.

PROJECT AND CONSTRUCTION MANAGEMENT:

Project and Construction Management are included as direct cost in the estimate, therefore no separate markup is included for these tasks. FUSRAP Management and Integration costs have not been incorporated into the estimate.

DESIGN COSTS:

Remedial Design associated with the design and preparation of project plans, specifications, and post RA documents has been assumed to be 8% of the total remedial action costs.

CONTINGENCY:

Contingencies are shown for both Design Contingencies and Construction Contingencies. EPA Guidance 540-R-00-002, July 2000 was used as a reference in developing design and construction contingencies.

A design contingency of 15% is being applied due to the proven implementation of these technologies. Excavation and offsite disposal technologies have been successfully implemented at other superfund sites however the design details (cleanup criteria, overexcavation required) of the soils to be excavated has not been finalized.

A construction contingency of 10% is being applied due to the potential for increases in soil volumes that have been common at other FUSRAP sites. This would also include cost overruns, modifications, and change orders.

	Quantity		Unit Cost	Total Cost	
4191-120 Alternative 3-Subsistence Farmer Removal Criteria and Offsite Disposal					
1 Painesville Site - Subsistence Farmer Removal Scenario					
3 Remedial Action					
05 Excavation and Disposal of Soils					
02 Site Development	6,100	CY	9.76	59,541	
08 Excavation of Soils	4,900	CY	43.38	212,582	
15 Transportation and Disposal	6,100	CY	583.72	3,560,700	
20 Site Restoration	6,100	CY	23.60	143,965	
SUBTOTAL Excavation and Disposal of Soils	6,100	CY	651.93	3,976,788	83%
10 Rad Monitoring Program					
4 Rad Technician				253,329	
05 Rad Analytical Soils	6,100	CY	9.52	58,098	
04 Rad Analytical Urine/Feces	6,100	CY	0.75	4,577	
SUBTOTAL Rad Monitoring Program	6,100	CY	51.80	316,004	7%
20 Site Supervisory Labor					
1 Site Superintendent				137,597	
2 SSHO				139,072	
Field Engineer				101,981	
4 Waste Management				103,519	
SUBTOTAL Site Supervisory Labor	6,100	CY	79.04	482,169	10%
SUBTOTAL Remedial Action	6,100	CY	782.78	4,774,961	93%
10 Home Office Support					
01 RA Home Office Support				369,800	100%
SUBTOTAL Home Office Support	6,100	CY	60.62	369,800	7%
SUBTOTAL Painesville Site - Subsistence Farmer Removal Scenario	6,100	CY	843.40	5,144,761	100%
Alternative 3-Subsistence Farmer Removal Criter	**6,100**	**CY**	**843.40**	**5,144,761**	

		Quantity		Unit Cost	Total Cost

4191-120 Alternative 3-Subsistence Farmer Removal Criteria and Offsite Disposal

1 Painesville Site - Subsistence Farmer Removal Scenario

3 Remedial Action

05 Excavation and Disposal of Soils

Line item is summary of costs associated with the excavation and off-site disposal of soils found to be exceeding the preliminary remediation goals for the subsistence farmer.

02 Site Development

This element represents required preliminary site activities for mobilizing equipment, site access restrictions with a temporary fence, erosion control, surveying, and decontamination pad. These engineering controls will only be implemented during performance of remedial action.

10 Mob/Demob

For mob and demob of 5 pieces of equipment (assumes 1 loader, 1 loader, 1 compactor, 1 dozer, and 1 crane)

		Quantity		Unit Cost	Total Cost
023052500100	Mobil Or Demobil, Dozer, Lder, Backhoe Or Exc, Above 250 H.P.	10.00	EA	270.00	2,700

For mob and demob of 5 pieces of equipment (assumes 1 loader, 1 loader, 1 compactor, 1 dozer, and 1 crane)

	SUBTOTAL Mob/Demob	**6,100**	**CY**	**0.44**	**2,700**

20 Temporary Fence and Erosion Control

This element represents costs associated with the implementation of temporary fencing and erosion and sediment control measures prior to the implementation of the remedial activity. Total Area = 75,000 sf. Assume 6 areas to be enclosed at 12,500 sf each. Add 30% for buffer area. Perimeter = 6 areas x 450 lf each x 1.3 = 3,600 lf.

		Quantity		Unit Cost	Total Cost
023705501000	Erosion Control, Silt Fence, Polypropylene, 3' High, Ideal Conditions	3,600.00	LF	0.69	2,484
028205287001	Fence, Misc Metal, Snow Fence On Steel Posts 10' Oc, 4' High	3,600.00	LF	3.60	12,960
	SUBTOTAL Temporary Fence and Erosion Control	**3,600**	**LF**	**4.29**	**15,444**

30 Surveying

Costs associated with land surveying activities, including initial survey and as-built/final survey and plan development.

5 Initial Survey

3 man crew for 1 day to establish a baseline plan of existing conditions and site features. Assume 24 hours for plan development

		Quantity		Unit Cost	Total Cost
011077001200	Surveying, Crew For Building Layout, 3 Person Crew	1.00	DAY	1,200.00	1,200
33220106	Plan Development - Staff Engineer	24.00	HR	54.31	1,303
	SUBTOTAL Initial Survey	**1**	**DAY**		**2,503**

		Quantity		Unit Cost	Total Cost
	10 As-built and Final Surveys				

Assume 10 visits at 0.5 days each.

3 man crew for 5 days during the remedial action phase to perform as-built surveys and to conduct a final construction survey. Includes final construction plan development.

		Quantity		Unit Cost	Total Cost
011077001200	Surveying, Crew For Building Layout, 3 Person Crew	5.00	DAY	1,200.00	6,000
33220106	Plan Development - Staff Engineer	40.00	HR	54.31	2,172
	SUBTOTAL As-built and Final Surveys	**1**	**LS**		**8,172**
	SUBTOTAL Surveying	**6,100**	**CY**	**1.75**	**10,676**
	30 Decontamination Allowance				
Task00128	Decontamination Pad Allowance	1.00	EA	5,000.00	5,000
	SUBTOTAL Decontamination Allowance	**6,100**	**CY**	**0.82**	**5,000**
	SUBTOTAL Site Development	**6,100**	**CY**	**5.54**	**33,820**
	08 Excavation of Soils				

Line item represents costs associated with the excavation of approximately 4,900 cubic yards of impacted material from designated areas throughout the site. Assumes the excavated material will be loaded directly into intermodals for transportation to the rail staging area.

For estimating purposes, excavation of impacted soils will be performed in Level D due to the potential of airborne migration of contaminated material during excavation and handling activities.

Volume Summary
3,750 cy in situ (1)
4,900 cy in situ with 30% constructability factor (2)
6,100 ex situ cy with 25% swell factor (3)

8,300 ex situ tons using a 1.35 tons/cy conversion factor.

(1) In situ modeling based on 3D site model and volume calculation. All volumes rounded to the nearest 50 cy.
(2) In situ volume with 30% constructability factor includes additional adjacent soils that will be removed during excavation. This factor accounts for more geometrically configured excavation areas and depths compared to the ones created by the 3-D model.
(3) Ex situ volume includes a 25% swell factor which accounts for soils expansion after excavation. This volume is used for transportation and disposal activities.

Assumes loadout will be limited to 7 intermodals per day at 20 tons (exsitu) each for a total of 140 tons/day.

Duration = 8,300 tons / 140 tons/day = 60 days or 480 hrs.

		Quantity		Unit Cost	Total Cost
CLAB	Common Building Laborers (3 each)	1,440.00	HR	36.50	52,560
EQMD	Equipment Operators, Medium Equipment	480.00	HR	45.95	22,056
015902000200	Hyd. Excavator, 1.5 C.Y.	480.00	HR	88.13	42,302
XMIXX010	MISC. POWER TOOLS	480.00	HR	6.40	3,072
XMIXX020	SMALL TOOLS	480.00	HR	1.58	758
	SUBTOTAL Excavation of Soils	**4,900**	**CY**	**24.64**	**120,749**

		Quantity		Unit Cost	Total Cost

15 Transportation and Disposal

There are 6,100 total ex situ cy of material to be disposed of as LLW at a facility such as Envirocare. The estimated quote given by MHF Transportation included hauling from the Luckey Site to an intermodal loading facility and transporting via rail to Envirocare. Assume Painesville transportation cost will be same as Luckey quote. Assume each rail car holds 6 intermodals and each intermodal holds 20 tons each.

Assume each intermodal will have average 6 week turnaround time rental (time it arrives on site to time it is returned to site). Assume 7 intermodals will be loaded per day. Based on these assumptions for volume leaving site (8,300 tons) , approximately 210 intermodal containers will be required to support excavation activities. The total number of intermodals required is 415.

01 Transportation to Disposal Facility

Vendor Quote is $150.15/cy. Add 5% for demurrage and other misc expenses = $157.66, say $160/cy.

Rate Includes :
Providing highway transportation, intermodal containers, liners, private flatcars to support direct truck/rail shipments, lifts at rail yard, return of empty containers.

Rates based on material being DOT Exempt, Non-Placarded

Rate exclude: Truck Demurrage @ $65.00/Hour after 2 free hours of loading and unloading, truck ordered not used $550.00/truck, Railcar Demurrage @ $ 65.00 /Day after 5 free days from when car is available to be loaded and unloaded, container mobilization @ $500.00/container (2 containers per flatbed), container demobilization @ $500.00/container (2 containers per flatbed), rejected shipments will be billed at same rate as above, and damage to equipment due to improper handling during loading/unloading will be charged @ Cost +15%. application

VENDOR	Mob & Demob of Containers	210.00	EA	1,000.00	210,000
VENDOR	Rail Transport to Envirocare	8,300.00	TONS	160.00	1,328,000
	SUBTOTAL Transportation to Disposal Facility	**6,100**	**CY**	**252.13**	**1,538,000**

02 Disposal Costs

6,100 cy of materials will be disposed at a facility such as US Ecology of Idaho.

Assume 90% will be classified as LLW. (5,490 cy)
Assume 10% will be classified as Mixed Waste. (610 cy)

VENDOR	LLW Disposal Fees per Contract DACW41-99-D-9006	5,490.00	CY	71.50	392,535
VENDOR	Mixed Waste Disposal Fees per Contract DACW41-99-D-9006	610.00	CY	97.50	59,475
	SUBTOTAL Disposal Costs	**6,100**	**CY**	**74.10**	**452,010**

03 Waste Characterization

Assumes 1 sample/500 cy of material.

Total = 6,100 cy / 500 cy/ sample = 13 samples. Assume $2,500/sample.

ENGREST	Waste Characterization Analysis	13.00	EA	2,500.00	32,500
	SUBTOTAL Waste Characterization	**6,100**	**CY**	**5.33**	**32,500**
	SUBTOTAL Transportation and Disposal	**6,100**	**CY**	**331.56**	**2,022,510**

		Quantity		Unit Cost	Total Cost

20 Site Restoration

Line item represents the cost of restoring the excavated and disturbed areas of the site upon completion of soil excavation at the site. Line items assumes restoration will be limited to backfilling and seeding.

09 Backfill and Compaction

Unclassified Fill, 6" Lifts, Offsite, Includes Delivery, Spreading, and Compaction.

		Quantity		Unit Cost	Total Cost
17030423	Unclassified Fill	6,100.00	CY	11.51	70,211
	SUBTOTAL Backfill and Compaction	**6,100**	**CY**	**11.51**	**70,211**

14 Hydroseeding

Total Area is 75,000 and assume additional 30% for additional equipment damage.
Area = 100,000 sf or 2.3 acres, say 2.5 acres.

		Quantity		Unit Cost	Total Cost
18050402	Seeding, Vegetative Cover	2.50	ACR	4,625.00	11,563
	SUBTOTAL Hydroseeding	**3**	**ACR**	**4,625.00**	**11,563**
	SUBTOTAL Site Restoration	**6,100**	**CY**	**13.41**	**81,774**
	SUBTOTAL Excavation and Disposal of Soils	**6,100**	**CY**	**370.30**	**2,258,852**

10 Rad Monitoring Program

4 Rad Technician

Includes monitoring, sampling and analysis, verification, and decontamination confirmation testing.
Assume three rad technician for the duration of the project.

This WBS covers 3 IH/HP technicians for 4.1 months = 722 hrs. each.

Equipment pricing base on Vendor Quote (SEC 2/2001;Rates escalated to 2/2002)- The monitoring equipment includes the following:

1. Model 2929 dual channel scaler (1 @ $365/mo =$365/mo)
2. Ratemeter w/GM pancake, 44-9 or equal (1 @ $195/mo = $195/mo)
3. Alarming Frisker w/ GM pancake, 44-9 or equal (1 @ $133/mo = $133/mo)
5. Personal Air Sampling pumps (2 @ $83/mo = $166/mo)
7. Personal air sampling pump charger (2 @ $52/mo = $104/mo)
8. Low Volume air samplers (2 @ $102/mo = $204/mo)

Total = $1,167/month. Use $1,500/mo direct cost to account for other miscellaneous equipment or supplies.

		Quantity		Unit Cost	Total Cost
33021498	IH/HP Technicians	2,166.00	HR	35.84	77,629
ENGREST	IH/HP Technician, 1 pers. (Travel premium)	2,166.00	HR	27.13	58,764
Vendor Quote	IH/HP Monitoring Equipment	5.00	MO	1,500.00	7,500
	SUBTOTAL Rad Technician	**1**	**LS**		**143,893**

05 Rad Analytical Soils

Assume 1 sample every 100 sy. Total Area = 75,000 sf or 8,400 sy

Total samples = 8,400 sy / 100 sy/sample = 84 samples. Add 30% for hot spot and miscellaneous = 110 samples.

		Quantity		Unit Cost	Total Cost
ENGREST	Rad and Chemical Analysis	110.00	EA	300.00	33,000
	SUBTOTAL Rad Analytical Soils	**6,100**	**CY**	**5.41**	**33,000**
	04 Rad Analytical Urine/Feces				
33022307	Bioassays (2 ea x 10 people)	20.00	EA	130.00	2,600
	SUBTOTAL Rad Analytical Urine/Feces	**6,100**	**CY**	**0.43**	**2,600**
	SUBTOTAL Rad Monitoring Program	**6,100**	**CY**	**29.43**	**179,493**

20 Site Supervisory Labor

Total hours of on-site construction: 4.1 months x 176 hrs/mo = 722 hours

Travel Premium = 85 for meals and lodging/day, 45 for rental car/day, and 15/day for monthly trip, and 10/day for misc. = $155/day

$155/day x 7 days/week / 40 hours/week = $27.13/hr

		Quantity		Unit Cost	Total Cost
	1 Site Superintendent				
99110203	Site Superintendent (Hourly Labor Rate)	722.00	HR	81.12	58,569
ENGREST	Site Superintendent (Hourly Travel Premium)	722.00	HR	27.13	19,588
	SUBTOTAL Site Superintendent	**1**	**LS**		**78,157**
	2 SSHO				
99110703	SSHO, 1 pers. (Hourly Labor Rate)	722.00	HR	82.28	59,406
ENGREST	SSHO, 1 pers. (Hourly Travel Premium)	722.00	HR	27.13	19,588
	SUBTOTAL SSHO	**1**	**LS**		**78,994**
	Field Engineer				
99110403	Field Engineer (Hourly Labor Rate)	722.00	HR	53.10	38,338
ENGREST	Field Engineer, (Hourly Travel Premium)	722.00	HR	27.13	19,588
	SUBTOTAL Field Engineer	**1**	**LS**		**57,926**
	4 Waste Management				
33220106	Staff Engineer, 1 pers. (Hourly Labor Rate)	722.00	HR	54.31	39,212
ENGREST	Staff Engineer, 1 pers. (Hourly Travel Premium)	722.00	HR	27.13	19,588
	SUBTOTAL Waste Management	**1**	**LS**		**58,800**
	SUBTOTAL Site Supervisory Labor	**6,100**	**CY**	**44.90**	**273,876**
	SUBTOTAL Remedial Action	**6,100**	**CY**	**444.63**	**2,712,221**

10 Home Office Support

This line item represents costs associated with the completion of remedial activities. There are no operation, maintenace, and monitoring (O,M,&M) activities required upon completion of remedial activities.

Hours a percentage of the FTE assumed for personnel listed. A FTE is equal to approximately 2,000 hrs/year based on an 8 hour day. Assume a 2.4 multiplier for all professional labor to include fringes.

		Quantity		Unit Cost	Total Cost

01 RA Home Office Support

Travel cost assumes 3 trips each person for 3 days.

Travel Premium = 85 for meals and lodging/day, 45 for rental car/day, and 200/day for trip, and 10/day for misc. = $340/day

$340/day/ 8 hours/day = $42.50/hr.

FTE = 176 hours/mo

176 hrs/mo x 4.1 mos. = 722 hours (Full time FTE)
88 hrs/mo x 4.1 mos. = 361 hours (0.5 FTE)
44 hrs./mo x 4.1 mos. = 180 hours (0.25 FTE)

		Quantity		Unit Cost	Total Cost
33220101	Senior Manager (Hourly Labor Rate)	361.00	HR	109.90	39,674
ENGREST	Senior Manager (Hourly Travel Premium)	72.00	HR	42.50	3,060
33220104	Senior Engineer (Hourly Labor Rate)	722.00	HR	91.90	66,352
ENGREST	Senior Engineer (Hourly Travel Premium)	72.00	HR	42.50	3,060
33220106	Prjt. Control/Scheduler (Hourly Labor Rate)	361.00	HR	54.31	19,606
ENGREST	Prjt. Control/Scheduler (Hourly Travel Premium)	72.00	HR	42.50	3,060
33220110	Attorney/QA/H&S (Hourly Labor Rate)	361.00	HR	120.48	43,493
ENGREST	Attorney/QA/H&S (Hourly Travel Premium)	72.00	HR	42.50	3,060
33220106	Community Relations (Hourly Labor Rate)	361.00	HR	54.31	19,606
33220113	Admin/Data Mgmnt. (Hourly Labor Rate)	132.00	HR	34.39	4,539
33220113	Finance/Purchasing (Hourly Labor Rate)	132.00	HR	34.39	4,539
SUBTOTAL RA Home Office Support		**1**	**LS**		**210,050**
SUBTOTAL Home Office Support		**6,100**	**CY**	**34.43**	**210,050**
SUBTOTAL Painesville Site - Subsistence Farmer Removal S		**6,100**	**CY**	**479.06**	**2,922,271**

	Quantity		Unit Cost	Total Cost
SUBTOTAL	*6,100*	*CY*	*479.06*	*2,922,271*
Field Overhead - Prime Contractor - PR	15.0%		71.86	438,341
Home Ofc. Overhead - Prime Contractor - PR	5.0%		27.55	168,031
Profit - Prime Contractor - PR	8.0%		46.28	282,291
SUBTOTAL	*6,100*	*CY*	*624.74*	*3,810,934*
Remedial Design	8.0%		49.98	304,875
Contingencies	25.0%		168.68	1,028,952
Alternative 3-Subsistence Farmer Removal Criteria a	**6,100**	**CY**	**843.40**	**5,144,761**

Alternative 4 - Industrial Removal Criteria and Offsite Disposal

Project No. 4191-120

Designed By:

SAIC - Columbus, Ohio

Estimated By:

Mike Poligone

Prepared By: Mike Poligone
Preparation Date: 07/01/2002

Effective Date of Pricing: 07/01/2002
Est Construction Time: 40 Days

CostLink CM Report	Page Number

This is the cost estimate for Alternative 4, the Industrial Removal Scenario, for the Painesville FUSRAP Site in Painesville, Ohio. This alternative is described in the Painesville Site Feasibility Study.

Under this alternative, impacted soil exceeding the preliminary remediation goals for an industrial site will be excavated and transported off-site for disposal at an approved commercial facility permitted or licensed to accept the material.

Tasks associated with Alternative 4 include: a) preparation of design specifications and plans; b) excavation of contaminated soils ; c) transportation and off-site disposal of the material d) backfill of excavated areas; and e) environmental monitoring.

PAINESVILLE SITE KEY PARAMETERS:

Contaminated Site Soil Volumes - Industrial Removal Criteria
In Situ LLW Soil Volume = 700 cy
LLW Soil w/ 30% overexcavation = 950 cy
LLW Excav w/ 25% expansion (ex situ) = 1,200 cy

Overexcavation Factor --- --- --- --- --- 1.30
Expansion Factor --- --- --- --- --- 1.25
Available construction weeks(mos.) per year --- 40 (9 mos)
Available construction days/month --- --- --- 22
Available construction hours/day --- --- --- 8

1. Volumes are based on SAIC Earthvision 3D Model
2. In situ excavation volumes include a 30% increase to account for overexcavation.
3. Ex situ excavation volumes include a 25% increase to account for expansion of soil (swell factor).

PROJECT SCHEDULE SUMMARY:

The estimated start date for field activities under this alternative is March 2003. The project schedule is based on 8 hours per day and 5 days per week.

Engineering Design = 0.5 to 1 year

Remedial Action = 45 days or 9 weeks or 2.05 months

Mobilization and Preparatory Activities = 5 days
Excavation Activities = 17 days
Verification and Hot Spot Removal = 15 days
Restoration and Decon Activities = 5 days
Demob = 3 days

Post RA Reports and As-builts = 0.5 to 1 year

O&M Period = 1,000 years

ESCALATION:

The purpose of this cost estimate is to evaluate multiple alternatives proposed for remediating the Painesville Site. This estimate is not intended for construction purposes. Therefore, the base year of comparison will be CY2002 and escalation will only be applied to cost data used in this estimate prior to CY2002. If prices are required to be escalated, the escalation determinations will be made using the Tri-Service Military Construction Program (MCP) Indexes based on DOD Comptroller Revised Inflation Guidance memorandum.

OTHER PROJECT COSTS

Two overhead markups were applied to the direct cost elements as follows:

(1) Field Overhead - A 15% field overhead markup was applied to the direct project cost to account for all general conditions (i.e. Mobilization and Demobilization cost) including field supervision of labor. This overhead item also includes submittals, training, and miscellaneous ODC items required for the project.

(2) Office Overhead - A 5% office overhead markup has been applied for engineering and technical support during construction and after construction.

(3) Profit - An 8% markup for profit was applied to the direct project cost.

(4) Professional Labor - A 100% markup was applied to all professional labor for fringes and overhead.

PROJECT AND CONSTRUCTION MANAGEMENT:

Project and Construction Management are included as direct cost in the estimate, therefore no separate markup is included for these tasks. FUSRAP Management and Integration costs have not been incorporated into the estimate.

DESIGN COSTS:

Remedial Design associated with the design and preparation of project plans, specifications, and post RA documents has been assumed to be 10% of the total remedial action costs.

CONTINGENCY:

Contingencies are shown for both Design Contingencies and Construction Contingencies. EPA Guidance 540-R-00-002, July 2000 was used as a reference in developing design and construction contingencies.

A design contingency of 15% is being applied due to the proven implementation of these technologies. Excavation and offsite disposal technologies have been successfully implemented at other superfund sites however the design details (cleanup criteria, overexcavation required) of the soils to be excavated has not been finalized.

A construction contingency of 10% is being applied due to the potential for increases in soil volumes that have been common at other FUSRAP sites. This would also include cost overruns, modifications, and change orders.

4191-120 Alternative 4 - Industrial Removal Criteria and Offsite Disposal

	Quantity		Unit Cost	Total Cost	
1 Painesville Site - Alternative 4					
3 Remedial Action					
05 Excavation and Disposal of Soils					
02 Site Development	1,200	CY	28.92	34,705	
08 Excavation of Soils	1,200	CY	39.39	47,266	
15 Transportation and Disposal	1,200	CY	519.54	623,453	
20 Site Restoration	1,200	CY	21.13	25,351	
13 Land Use Controls	110,000	SF	0.63	68,750	
SUBTOTAL Excavation and Disposal of Soils	1,200	CY	666.27	799,524	67%
10 Rad Monitoring Program					
4 Rad Technician				95,557	
05 Rad Analytical Soils	1,200	CY	10.31	12,375	
04 Rad Analytical Urine/Feces	1,200	CY	2.98	3,575	
SUBTOTAL Rad Monitoring Program	1,200	CY	92.92	111,507	9%
01 Land Use Controls					
0801 Long Term Management Plan and Site Database				85,718	
0802 Land Use Controls				12,089	
SUBTOTAL Land Use Controls	110,000	SF	0.89	97,807	8%
20 Site Supervisory Labor					
1 Site Superintendent				52,393	
2 SSHO				52,954	
Field Engineer				38,831	
4 Waste Management				39,417	
SUBTOTAL Site Supervisory Labor	1,200	CY	153.00	183,596	15%
SUBTOTAL Remedial Action	1,200	CY	993.69	1,192,434	7%
10 Home Office Support					
1 RA Home Office Support	1,200	CY	174.71	209,658	100%
SUBTOTAL Home Office Support	1,200	CY	174.71	209,658	1%
15 Operations and Maintenance					
10 Inspection					
10 Site Inspection	1,000	YR	4,206.40	4,206,400	
15 Well Sampling	6	EA	185,900.00	1,115,400	
20 Gamma Survey	200	EA	6,875.00	1,375,000	
SUBTOTAL Inspection	1,000	YR	6,696.80	6,696,800	40%
01 Land Use Controls					
0801 Long Term Management Plan and Site Database	1,000	YR	8,066.30	8,066,300	
SUBTOTAL Land Use Controls	1,000	YR	8,066.30	8,066,300	49%

	Quantity		Unit Cost	Total Cost	
Five Year Review					
5 File Review	200	EA	1,792.23	358,446	
10 Report Preparation	200	EA	7,221.17	1,444,234	
SUBTOTAL Five Year Review	1,000	YR	1,802.68	1,802,680	11%
SUBTOTAL Operations and Maintenance	1,000	YR	16,565.78	16,565,780	92%
SUBTOTAL Painesville Site - Alternative 4	1,200	CY	14,973.23	17,967,872	100%
Alternative 4 - Industrial Removal Criteria and Off	**1,200**	**CY**	**14,973.23**	**17,967,872**	

		Quantity		Unit Cost	Total Cost

4191-120 Alternative 4 - Industrial Removal Criteria and Offsite Disposal

1 Painesville Site - Alternative 4

3 Remedial Action

05 Excavation and Disposal of Soils

Line item is summary of costs associated with the excavation and off-site disposal of soils found to be exceeding the preliminary remediation goals for an industrial use scenario.

02 Site Development

This element represents required preliminary site activities for mobilizing equipment, site access restrictions with a temporary fence, erosion control, surveying, and decontamination pad. These engineering controls will only be implemented during performance of remedial action.

10 Mob/Demob

For mob and demob of 5 pieces of equipment (assumes 1 excavator, 1 loader, 1 compactor, 1 dozer, and 1 crane)

		Quantity		Unit Cost	Total Cost
023052500100	Mobil Or Demobil, Dozer, Lder, Backhoe Or Exc, Above 250 H.P.	10.00	EA	270.00	2,700
	SUBTOTAL Mob/Demob	**1,200**	**CY**	**2.25**	**2,700**

20 Site Development

This element represents costs associated with the implementation of temporary fencing and erosion and sediment control measures prior to the implementation of the remedial activity. Total Area = 15,000 sf. Assume 6 areas to be enclosed at 2,500 sf each. Add 30% for buffer area. Perimeter = 6 areas x 200 lf x 1.3 = 1,600 lf.

		Quantity		Unit Cost	Total Cost
023705501000	Erosion Control, Silt Fence, Polypropylene, 3' High, Ideal Conditions	1,600.00	LF	0.69	1,104
028205287001	Fence, Misc Metal, Snow Fence On Steel Posts 10' Oc, 4' High	1,600.00	LF	3.60	5,760
	SUBTOTAL Site Development	**1,200**	**CY**	**5.72**	**6,864**

30 Surveying

Costs associated with land surveying activities, including initial survey and as-built/final survey and plan development.

5 Initial Survey

3 man crew for 1 day to establish a baseline plan of existing conditions and site features. Assume 24 hours for plan development

		Quantity		Unit Cost	Total Cost
011077001200	Surveying, Crew For Building Layout, 3 Person Crew	1.00	DAY	1,200.00	1,200
33220106	Plan Development - Staff Engineer	24.00	HR	54.31	1,303
	SUBTOTAL Initial Survey	**1,200**	**CY**	**2.09**	**2,503**

		Quantity		Unit Cost	Total Cost
	10 As-built and Final Surveys				

Assume 10 visits at 0.5 days each.

3 man crew for 5 days during the remedial action phase to perform as-built surveys and to conduct a final construction survey. Includes final construction plan development.

		Quantity		Unit Cost	Total Cost
011077001200	Surveying, Crew For Building Layout, 3 Person Crew	5.00	DAY	1,200.00	6,000
33220106	Plan Development - Staff Engineer	40.00	HR	54.31	2,172
	SUBTOTAL As-built and Final Surveys	**1,200**	**CY**	**6.81**	**8,172**
	SUBTOTAL Surveying	**1,200**	**CY**	**8.90**	**10,676**
	30 Decontamination Allowance				
Task00128	Decontamination Pad Allowance	1.00	EA	5,000.00	5,000
	SUBTOTAL Decontamination Allowance	**1,200**	**CY**	**4.17**	**5,000**
	SUBTOTAL Site Development	**1,200**	**CY**	**21.03**	**25,240**
	08 Excavation of Soils				

Line item represents costs associated with the excavation of approximately 950 cubic yards of impacted material from designated areas throughout the site. Assumes the excavated material will be loaded directly into intermodals for transportation to the rail staging area.

For estimating purposes, excavation of impacted soils will be performed in Level D due to the potential of airborne migration of contaminated material during excavation and handling activities.

Volume Summary
700 cy in situ (1)
950 cy in situ with 30% constructability factor (2)
1,200 ex situ cy with 25% swell factor (3)

1,700 tons ex situ using a 1.35 tons/cy conversion factor.

(1) In situ modeling based on 3D site model and volume calculation. All volumes rounded to the nearest 50 cy.
(2) In situ volume with 30% constructability factor includes additional adjacent soils that will be removed during excavation. This factor accounts for more geometrically configured excavation areas and depths compared to the ones created by the 3-D model.
(3) Ex situ volume includes a 25% swell factor which accounts for soils expansion after excavation. This volume is used for transportation and disposal activities.

Assumes loadout will be limited to 5 intermodals per day at 20 tons (exsitu) each for a total of 100 tons/day.

Duration = 1,700 tons / 100 tons/day = 17 days or 136 hrs.

		Quantity		Unit Cost	Total Cost
CLAB	Common Building Laborers (3 each)	408.00	HR	36.50	14,892
EQMD	Equipment Operators, Medium Equipment	136.00	HR	47.15	6,412
015902000200	Hyd. Excavator, 1.5 C.Y.	136.00	HR	88.13	11,986
XMIXX010	MISC. POWER TOOLS	136.00	HR	6.40	870
XMIXX020	SMALL TOOLS	136.00	HR	1.58	215
	SUBTOTAL Excavation of Soils	**1,200**	**CY**	**28.65**	**34,375**

		Quantity		Unit Cost	Total Cost

15 Transportation and Disposal

There are 1,200 total ex situ cy of material to be disposed of as LLW at a facility such as Envirocare. The estimated quote given by MHF Transportation included hauling from the Luckey Site to an intermodal loading facility and transporting via rail to Envirocare. Assume Painesville transportation cost will be same as Luckey quote. Assume each rail car holds 6 intermodals and each intermodal holds 20 cy each.

Assume each intermodal will have average 6 week turnaround time rental (time it arrives on site to time it is returned to site). Assume 5 intermodals will be loaded per day. Based on these assumptions for volume leaving site (1,700 tons) , approximately 85 intermodal containers will be required to support excavation activities. The total number of intermodals required is 85 (no return intermodals will be required).

01 Transportation to Disposal Facility

Vendor Quote is $150.15/cy. Add 5% for demurrage and other misc expenses = $157.66, say $160/cy.

Rate Includes :
Providing highway transportation, intermodal containers, liners, private flatcars to support direct truck/rail shipments, lifts at rail yard, return of empty containers.

Rates based on material being DOT Exempt, Non-Placarded

Rate exclude: Truck Demurrage @ $65.00/Hour after 2 free hours of loading and unloading, truck ordered not used $550.00/truck, Railcar Demurrage @ $ 65.00 /Day after 5 free days from when car is available to be loaded and unloaded, container mobilization @ $500.00/container (2 containers per flatbed), container demobilization @ $500.00/container (2 containers per flatbed), rejected shipments will be billed at same rate as above, and damage to equipment due to improper handling during loading/unloading will be charged @ Cost +15%. application

		Quantity		Unit Cost	Total Cost
VENDOR	Mob & Demob of Containers	85.00	EA	1,000.00	85,000
VENDOR	Rail Transport to Envirocare	1,700.00	TONS	160.00	272,000
SUBTOTAL Transportation to Disposal Facility		**1,200**	**CY**	**297.50**	**357,000**

02 Disposal Costs

1,200 cy of materials will be disposed at a facility such as US Ecology of Idaho.

Assume 90% will be classified as LLW. (1,080 cy)
Assume 10% will be classified as Mixed Waste. (120 cy)

		Quantity		Unit Cost	Total Cost
VENDOR	Mixed Waste Disposal Fees per Contract DACW41-99-D-9006	120.00	CY	97.50	11,700
VENDOR	LLW Disposal Fees per Contract DACW41-99-D-9006	1,080.00	CY	71.50	77,220
SUBTOTAL Disposal Costs		**1,200**	**CY**	**74.10**	**88,920**

03 Waste Characterization

Assumes 1 sample/500 cy of material.

Total = 1,200 cy / 500 cy/ sample = 3 samples. Assume $2,500/sample.

		Quantity		Unit Cost	Total Cost
ENGREST	Waste Characterization Analysis	3.00	EA	2,500.00	7,500
SUBTOTAL Waste Characterization		**1,200**	**CY**	**6.25**	**7,500**
SUBTOTAL Transportation and Disposal		**1,200**	**CY**	**377.85**	**453,420**

		Quantity		Unit Cost	Total Cost

20 Site Restoration

Line item represents the cost of restoring the excavated and disturbed areas of the site upon completion of soil excavation at the site. Line items assumes restoration will be limited to backfilling and seeding.

09 Backfill and Compaction

Unclassified Fill, 6" Lifts, Offsite, Includes Delivery, Spreading, and Compaction.

		Quantity		Unit Cost	Total Cost
17030423	Unclassified Fill	1,200.00	CY	11.51	13,812
	SUBTOTAL Backfill and Compaction	**1,200**	**CY**	**11.51**	**13,812**

14 Hydroseeding

Total Area is 15,000. An additional 30% for additional equipment damage.

Area = 20,000 sf or 0.5 acres, say 1 acre.

		Quantity		Unit Cost	Total Cost
18050402	Seeding, Vegetative Cover	1.00	ACR	4,625.00	4,625
	SUBTOTAL Hydroseeding	**20,000**	**SF**	**0.23**	**4,625**
	SUBTOTAL Site Restoration	**1,200**	**CY**	**15.36**	**18,437**

13 Land Use Controls

Includes an allowance of $50,000 for implementation of land use controls and development of a Land Use Controls Implementation Plan.

		Quantity		Unit Cost	Total Cost
Task00036	Land Use Controls Allowance	1.00	LS	50,000.00	50,000
	SUBTOTAL Land Use Controls	**110,000**	**SF**	**0.45**	**50,000**
	SUBTOTAL Excavation and Disposal of Soils	**1,200**	**CY**	**484.56**	**581,472**

10 Rad Monitoring Program

Includes monitoring, sampling and analysis, and verification.

4 Rad Technician

Includes monitoring, sampling and analysis, verification, and decontamination confirmation testing. Assume three rad technician for the duration of the project.

This WBS covers 3 IH/HP technicians for 2 months = 352 hrs. each.

Equipment pricing base on Vendor Quote (SEC 2/2001;Rates escalated to 2/2002)- The monitoring equipment includes the following:

1. Model 2929 dual channel scaler (1 @ $365/mo =$365/mo)
2. Ratemeter w/GM pancake, 44-9 or equal (1 @ $195/mo = $195/mo)
3. Alarming Frisker w/ GM pancake, 44-9 or equal (1 @ $133/mo = $133/mo)
5. Personal Air Sampling pumps (2 @ $83/mo = $166/mo)
7. Personal air sampling pump charger (2 @ $52/mo = $104/mo)
8. Low Volume air samplers (2 @ $102/mo = $204/mo)

Total = $1,167/month. Use $1,500/mo direct cost to account for other miscellaneous equipment or supplies.

		Quantity		Unit Cost	Total Cost
33021498	IH/HP Technicians	1,056.00	HR	35.84	37,847

		Quantity		Unit Cost	Total Cost
ENGREST	IH/HP Technician, 1 pers. (Travel premium)	1,056.00	HR	27.13	28,649
Vendor Quote	IH/HP Monitoring Equipment	2.00	MO	1,500.00	3,000
SUBTOTAL Rad Technician		**1**	**LS**		**69,496**

05 Rad Analytical Soils

Assume 1 sample every 100 sy. Total Area = 15,000 sf or 1,700 sy

Total samples = 1,700 sy / 100 sy/sample = 17 samples. Add 30% for hot spot and miscellaneous = 22 samples, say 30 samples.

ENGREST	Rad and Chemical Analysis	30.00	EA	300.00	9,000
SUBTOTAL Rad Analytical Soils		**1,200**	**CY**	**7.50**	**9,000**

04 Rad Analytical Urine/Feces

33022307	Bioassays (2 each x 10 people)	20.00	EA	130.00	2,600
SUBTOTAL Rad Analytical Urine/Feces		**1,200**	**CY**	**2.17**	**2,600**
SUBTOTAL Rad Monitoring Program		**1,200**	**CY**	**67.58**	**81,096**

01 Land Use Controls

0801 Long Term Management Plan and Site Database

Develop Long Term Management Plan to address administrative or legal measures to reduce or minimize potential exposures to contaminants left on site.

Long Term Management Plan - Assume 400 hrs to research controls, coordinate with stakeholders, and develop plan. Use Senior PM Rate.

Site Information Database - Assume 200 hrs to develop a site database. Use Senior Engineer Rate

33220101	Long Term Management Plan	400.00	HR	109.90	43,960
33220104	Site Database	200.00	HR	91.90	18,380
SUBTOTAL Long Term Management Plan and Site Datab		**1**	**EA**		**62,340**

0802 Land Use Controls

Implement Land Use Controls - Assume 160 hours to implement land use controls. Use Senior PM Rate.

33220101	Implement Land Use Controls	80.00	HR	109.90	8,792
SUBTOTAL Land Use Controls		**1**	**EA**		**8,792**
SUBTOTAL Land Use Controls		**110,000**	**SF**	**0.65**	**71,132**

20 Site Supervisory Labor

Total hours of on-site construction: 2 months x 176 hrs/mo = 352 hours

Travel Premium = 85 for meals and lodging/day, 45 for rental car/day, and 15/day for monthly trip, and 10/day for misc. = $155/day

$155/day x 7 days/week / 40 hours/week = $27.13/hr

1 Site Superintendent

		Quantity		Unit Cost	Total Cost
99110203	Site Superintendent (Hourly Labor Rate)	352.00	HR	81.12	28,554
ENGREST	Site Superintendent (Hourly Travel Premium)	352.00	HR	27.13	9,550
SUBTOTAL Site Superintendent		**1**	**LS**		**38,104**
2 SSHO					
99110703	SSHO, 1 pers. (Hourly Labor Rate)	352.00	HR	82.28	28,963
ENGREST	SSHO, 1 pers. (Hourly Travel Premium)	352.00	HR	27.13	9,550
SUBTOTAL SSHO		**1**	**LS**		**38,512**
Field Engineer					
99110403	Field Engineer (Hourly Labor Rate)	352.00	HR	53.10	18,691
ENGREST	Field Engineer, (Hourly Travel Premium)	352.00	HR	27.13	9,550
SUBTOTAL Field Engineer		**1**	**LS**		**28,241**
4 Waste Management					
33220106	Staff Engineer, 1 pers. (Hourly Labor Rate)	352.00	HR	54.31	19,117
ENGREST	Staff Engineer, 1 pers. (Hourly Travel Premium)	352.00	HR	27.13	9,550
SUBTOTAL Waste Management		**1**	**LS**		**28,667**
SUBTOTAL Site Supervisory Labor		**1,200**	**CY**	**111.27**	**133,524**
SUBTOTAL Remedial Action		**1,200**	**CY**	**722.69**	**867,225**

10 Home Office Support

1 RA Home Office Support

Travel cost assumes 3 trips each person for 3 days.

Travel Premium = 85 for meals and lodging/day, 45 for rental car/day, and 200 for trip, and 10 for misc. = $340/day

$340/day/ 8 hours/day = $42.50/hr.

FTE = 176 hours/mo

176 hrs/mo x 2 mos. = 352 hours (Full time FTE)
88 hrs/mo x 2 mos. = 176 hours (0.5 FTE)
44hrs./mo x 2 mos. = 88 hours (0.25 FTE)

Travel premium time has been separated to distinguish between on-site versus off-site time and costs.

33220101	Senior Manager (Hourly Labor Rate)	352.00	HR	109.90	38,685
ENGREST	Senior Manager (Hourly Travel Premium)	72.00	HR	27.13	1,953
33220104	Senior Engineer (Hourly Labor Rate)	352.00	HR	91.90	32,349
ENGREST	Senior Engineer (Hourly Travel Premium)	72.00	HR	27.13	1,953
33220106	Prjt. Control/Scheduler (Hourly Labor Rate)	176.00	HR	54.31	9,559
ENGREST	Prjt. Control/Scheduler (Hourly Travel Premium)	72.00	HR	27.13	1,953
33220110	Attorney/QA/H&S (Hourly Labor Rate)	352.00	HR	120.48	42,409
ENGREST	Attorney/QA/H&S (Hourly Travel Premium)	72.00	HR	27.13	1,953
33220106	Community Relations (Hourly Labor Rate)	176.00	HR	54.31	9,559
33220113	Finance/Purchasing (Hourly Labor Rate)	176.00	HR	34.39	6,053
33220113	Admin/Data Mgmnt. (Hourly Labor Rate)	176.00	HR	34.39	6,053

		Quantity		Unit Cost	Total Cost
SUBTOTAL RA Home Office Support		**1,200**	**CY**	**127.07**	**152,478**
SUBTOTAL Home Office Support		**1,200**	**CY**	**127.07**	**152,478**

15 Operations and Maintenance

This element defines Operations and Maintenance requirements. Components include the following:

1) Annual site inspection and monitoring,
2) 5-Year Status Report.
3) Annual well sampling,
4) Annual gamma survey

O&M costs will be performed for a 1,000 year period.

10 Inspection

This element describes costs associated with an annual inspection program of the capped area.

10 Site Inspection

Assume two field engineers @ 16 hours each per year for site inspection and follow up report for 1,000 years.

2 Field Engineers x 16 hrs/event x 1,000 events = 32,000 hrs

99110403	Field Engineer, 2 pers. (Hourly Labor Rate) Assumes 50% on-site during project duration x 2 men	32,000.00	HR	53.10	1,699,200
ENGREST	Field Engineer, 2 pers. (Hourly Travel Premium)	32,000.00	HR	42.50	1,360,000
SUBTOTAL Site Inspection		**1,000**	**YR**	**3,059.20**	**3,059,200**

15 Well Sampling

Assumes sampling of 4 wells on a five-year basis with analysis for Rad COCs.

6 samples/event x 200 events = 1,200 samples

2 technicians @ 16 hrs per event x 200 events = 6,400 hrs

33029906	Subcontracted Sampling (each person)	6,400.00	HR	70.50	451,200
Task02492	Rad and Chemical Analysis	1,200.00	EA	300.00	360,000
SUBTOTAL Well Sampling		**6**	**EA**	**135,200.00**	**811,200**

20 Gamma Survey

Assumes $5,000 allowance to perform a gamma survey every 5 years for 30 year O&M period.

ENGREST	Gamma Survey	200.00	EA	5,000.00	1,000,000

Assumes $5,000 allowance to perform a gamma survey every 5 years for 1,000 year O&M period.

SUBTOTAL Gamma Survey		**200**	**EA**	**5,000.00**	**1,000,000**
SUBTOTAL Inspection		**1,000**	**YR**	**4,870.40**	**4,870,400**

01 Land Use Controls

		Quantity		Unit Cost	Total Cost
	0801 Long Term Management Plan and Site Database				

Maintain O&M plan to address administrative or legal measures to reduce or minimize potential for exposure to contaminants left on site. Assume the following:

Long Term Management Plan - Assume 40 hrs/yr for 1,000 yrs = 40,000 hrs to coordinate with stakeholders and make revisions to plan. Use Senior PM Rate.

Site Information Database - Assume 16 hrs/yr for 1,000 yrs = 16,000 hrs to update site database. Use Senior Engineer Rate.

		Quantity		Unit Cost	Total Cost
33220101	Long Term Management Plan	40,000.00	HR	109.90	4,396,000
33220104	Site Database	16,000.00	HR	91.90	1,470,400
	SUBTOTAL Long Term Management Plan and Site Datab	**1,000**	**YR**	**5,866.40**	**5,866,400**
	SUBTOTAL Land Use Controls	**1,000**	**YR**	**5,866.40**	**5,866,400**
	Five Year Review				

5-year status summary report for the following:

Annual Inspection results and review of state/federal files.
There will be a total of 200 reports generated over the 1,000-year period.

Assumes 3 days for each file review.

		Quantity		Unit Cost	Total Cost
	5 File Review				
33220106	Staff Engineer	4,800.00	HR	54.31	260,688
	SUBTOTAL File Review	**200**	**EA**	**1,303.44**	**260,688**
	10 Report Preparation				
33220104	Senior Engineer (16 hrs each)	3,200.00	HR	91.90	294,080
33220106	Staff Engineer (24 hrs each)	4,800.00	HR	54.31	260,688
33220110	Attorney (16 hrs each)	3,200.00	HR	120.48	385,536
33220113	Admin/Data Mgmnt. (16 hrs each)	3,200.00	HR	34.39	110,048
	SUBTOTAL Report Preparation	**200**	**EA**	**5,251.76**	**1,050,352**
	SUBTOTAL Five Year Review	**1,000**	**YR**	**1,311.04**	**1,311,040**
	SUBTOTAL Operations and Maintenance	**1,000**	**YR**	**12,047.84**	**12,047,840**
	SUBTOTAL Painesville Site - Alternative 4	**1,200**	**CY**	**10,889.62**	**13,067,543**
	SUBTOTAL	*1,200*	*CY*	*10,889.62*	*13,067,543*
	Remedial Design	10.0%		1,088.96	1,306,754
	Contingencies	25.0%		2,994.65	3,593,574
	Alternative 4 - Industrial Removal Criteria and Offs	**1,200**	**CY**	**14,973.23**	**17,967,872**

APPENDIX I

Risk and Dose for Remedial Options

Painesville FUSRAP Site RI/FS

APPENDIX I Painseville Post Excavation Dose and Risk Estimates by Exposure Unit and Receptor, Industrial Excavation

Post Excavation Industrial Dose and Risk Estimates Industrial Excavation

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU1	Actinium-227	0.56	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU1	Protactinium-231	1.06	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU1	Lead-210	3.00		3	3.786E-02	9.321E-16	0.1	0.0	3.575E-07	6.117E-21	1.1E-06	1.8E-20
EU1	Radium-226	2.99	1.42	1.57	1.634E+00	1.068E+00	2.6	1.7	3.092E-05	1.987E-05	4.9E-05	3.1E-05
EU1	Radium-228	1.09	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-228	1.45	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-230	2.85	2.56	0.29	8.793E-03	5.814E-01	0.0	0.2	4.077E-08	1.087E-05	1.2E-08	3.2E-06
EU1	Thorium-232	1.23	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU1	Uranium-234	7.94		7.94	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	2.1E-07	6.0E-07
EU1	Uranium-235	0.29	0.21	0.083	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	1.7E-07	1.6E-07
EU1	Uranium-238	3.82	2.88	0.94	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	4.2E-07	3.8E-07
						Total Dose =	**2.7**	**1.9**		**Total Risk =**	**5.0E-05**	**3.5E-05**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU2	Actinium-227	0.52	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU2	Protactinium-231	2.12	1.82	0.3	1.113E-01	5.449E-01	0.0	0.2	5.781E-07	5.751E-06	1.7E-07	1.7E-06
EU2	Lead-210	1.80		1.8	3.786E-02	9.321E-16	0.1	0.0	3.575E-07	6.117E-21	6.4E-07	1.1E-20
EU2	Radium-226	3.94	1.42	2.52	1.634E+00	1.068E+00	4.1	2.7	3.092E-05	1.987E-05	7.8E-05	5.0E-05
EU2	Radium-228	1.04	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-228	1.44	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-230	7.82	2.56	5.26	8.793E-03	5.814E-01	0.0	3.1	4.077E-08	1.087E-05	2.1E-07	5.7E-05
EU2	Thorium-232	1.13	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU2	Uranium-234	6.66		6.66	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	1.7E-07	5.0E-07
EU2	Uranium-235	0.34	0.21	0.127	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	2.6E-07	2.5E-07
EU2	Uranium-238	3.53	2.88	0.65	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	2.9E-07	2.7E-07
						Total Dose =	**4.3**	**6.0**		**Total Risk =**	**8.0E-05**	**1.1E-04**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU3	Actinium-227	0.59	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU3	Protactinium-231	2.11	1.82	0.29	1.113E-01	5.449E-01	0.0	0.2	5.781E-07	5.751E-06	1.7E-07	1.7E-06
EU3	Lead-210	0.53		0.53	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	1.9E-07	3.2E-21
EU3	Radium-226	2.92	1.42	1.5	1.634E+00	1.068E+00	2.5	1.6	3.092E-05	1.987E-05	4.6E-05	3.0E-05
EU3	Radium-228	0.88	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-228	1.19	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-230	5.21	2.56	2.65	8.793E-03	5.814E-01	0.0	1.5	4.077E-08	1.087E-05	1.1E-07	2.9E-05
EU3	Thorium-232	1.04	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU3	Uranium-234	2.72		2.72	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	7.0E-08	2.1E-07
EU3	Uranium-235	0.47	0.21	0.258	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	5.2E-07	5.1E-07
EU3	Uranium-238	2.70	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**2.6**	**3.3**		**Total Risk =**	**4.7E-05**	**6.1E-05**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU4	Actinium-227	0.45	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU4	Protactinium-231	1.63	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU4	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU4	Radium-226	3.40	1.42	1.98	1.634E+00	1.068E+00	3.2	2.1	3.092E-05	1.987E-05	6.1E-05	3.9E-05
EU4	Radium-228	0.78	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-228	1.09	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-230	9.12	2.56	6.56	8.793E-03	5.814E-01	0.1	3.8	4.077E-08	1.087E-05	2.7E-07	7.1E-05
EU4	Thorium-232	1.00	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU4	Uranium-234	2.54		2.54	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	6.6E-08	1.9E-07
EU4	Uranium-235	0.43	0.21	0.216	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	4.4E-07	4.3E-07
EU4	Uranium-238	2.84	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**3.3**	**6.0**		**Total Risk =**	**6.2E-05**	**1.1E-04**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I Painseville Post Excavation Dose and Risk Estimates by Exposure Unit and Receptor, Industrial Excavation

Post Excavation Industrial Dose and Risk Estimates Industrial Excavation

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU5	Actinium-227	0.51	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU5	Protactinium-231	1.70	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU5	Lead-210	1.20		1.2	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	4.3E-07	7.3E-21
EU5	Radium-226	2.70	1.42	1.28	1.634E+00	1.068E+00	2.1	1.4	3.092E-05	1.987E-05	4.0E-05	2.5E-05
EU5	Radium-228	1.10	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-228	1.85	1.53	0.32	1.254E+00	0.000E+00	0.4	0.0	2.840E-05	0.000E+00	9.1E-06	0.0E+00
EU5	Thorium-230	4.60	2.56	2.04	8.793E-03	5.814E-01	0.0	1.2	4.077E-08	1.087E-05	8.3E-08	2.2E-05
EU5	Thorium-232	1.37	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU5	Uranium-234	3.71		3.71	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	9.6E-08	2.8E-07
EU5	Uranium-235	0.40	0.21	0.19	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	3.9E-07	3.8E-07
EU5	Uranium-238	3.94	2.88	1.06	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	4.7E-07	4.3E-07
						Total Dose =	**2.6**	**2.6**		**Total Risk =**	**5.0E-05**	**4.9E-05**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU6	Actinium-227	0.59	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU6	Protactinium-231	1.59	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU6	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU6	Radium-226	5.75	1.42	4.33	1.634E+00	1.068E+00	7.1	4.6	3.092E-05	1.987E-05	1.3E-04	8.6E-05
EU6	Radium-228	1.10	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-228	1.27	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-230	4.33	2.56	1.77	8.793E-03	5.814E-01	0.0	1.0	4.077E-08	1.087E-05	7.2E-08	1.9E-05
EU6	Thorium-232	1.27	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU6	Uranium-234	0.00		0	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	0.0E+00	0.0E+00
EU6	Uranium-235	1.07	0.21	0.86	1.153E-01	1.168E-01	0.1	0.1	2.029E-06	1.979E-06	1.7E-06	1.7E-06
EU6	Uranium-238	6.03	2.88	3.15	2.545E-02	2.335E-02	0.1	0.1	4.447E-07	4.079E-07	1.4E-06	1.3E-06
						Total Dose =	**7.3**	**5.8**		**Total Risk =**	**1.4E-04**	**1.1E-04**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU7	Actinium-227	0.00	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU7	Protactinium-231	0.00	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU7	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU7	Radium-226	1.79	1.42	0.37	1.634E+00	1.068E+00	0.6	0.4	3.092E-05	1.987E-05	1.1E-05	7.4E-06
EU7	Radium-228	1.15	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-228	1.07	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-230	1.63	2.56	0	8.793E-03	5.814E-01	0.0	0.0	4.077E-08	1.087E-05	0.0E+00	0.0E+00
EU7	Thorium-232	1.01	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU7	Uranium-234	1.61		1.61	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	4.2E-08	1.2E-07
EU7	Uranium-235	0.11	0.21	0	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	0.0E+00	0.0E+00
EU7	Uranium-238	1.64	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**0.6**	**0.4**		**Total Risk =**	**1.1E-05**	**7.5E-06**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU8	Actinium-227	0.59	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU8	Protactinium-231	1.87	1.82	0.05	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	2.9E-08	2.9E-07
EU8	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU8	Radium-226	2.34	1.42	0.92	1.634E+00	1.068E+00	1.5	1.0	3.092E-05	1.987E-05	2.8E-05	1.8E-05
EU8	Radium-228	1.12	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-228	1.28	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-230	3.69	2.56	1.13	8.793E-03	5.814E-01	0.0	0.7	4.077E-08	1.087E-05	4.6E-08	1.2E-05
EU8	Thorium-232	1.28	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU8	Uranium-234	3.29		3.29	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	8.5E-08	2.5E-07
EU8	Uranium-235	0.38	0.21	0.165	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	3.3E-07	3.3E-07
EU8	Uranium-238	2.19	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**1.6**	**1.7**		**Total Risk =**	**2.9E-05**	**3.1E-05**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I Painseville Post Excavation Dose and Risk Estimates by Exposure Unit and Receptor, Subsistence Farmer Excavation

Post Excavation Residential Dose and Risk Estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU1	Actinium-227	0.37	0.61	0	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	0.0E+00	0.0E+00
EU1	Protactinium-231	1.06	1.82	0	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	0.0E+00	0.0E+00
EU1	Lead-210	0.00		0	2.184E-01	5.375E-15	0.0	0.0	5.958E-07	1.467E-20	0.0E+00	0.0E+00
EU1	Radium-226	1.53	1.42	0.11	3.022E+00	2.070E+00	0.3	0.2	5.369E-05	3.467E-05	5.9E-06	3.8E-06
EU1	Radium-228	1.12	1.41	0	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-228	1.36	1.53	0	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-230	2.08	2.56	0	2.752E-02	1.135E+00	0.0	0.0	3.993E-07	1.900E-05	0.0E+00	0.0E+00
EU1	Thorium-232	1.22	1.53	0	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU1	Uranium-234	4.58		4.58	1.270E-02	1.706E-02	0.1	0.1	5.285E-08	1.395E-07	2.4E-07	6.4E-07
EU1	Uranium-235	0.22	0.21	0.009	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	2.0E-08	2.0E-08
EU1	Uranium-238	2.18	2.88	0	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	0.0E+00	0.0E+00
						Total Dose =	**0.4**	**0.3**		**Total Risk =**	**6.2E-06**	**4.5E-06**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU2	Actinium-227	0.60	0.61	0	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	0.0E+00	0.0E+00
EU2	Protactinium-231	1.85	1.82	0.03	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	9.8E-08	2.4E-07
EU2	Lead-210	0.00		0	2.184E-01	5.375E-15	0.0	0.0	5.958E-07	1.467E-20	0.0E+00	0.0E+00
EU2	Radium-226	1.69	1.42	0.27	3.022E+00	2.070E+00	0.8	0.6	5.369E-05	3.467E-05	1.4E-05	9.4E-06
EU2	Radium-228	1.21	1.41	0	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-228	1.36	1.53	0	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-230	3.71	2.56	1.15	2.752E-02	1.135E+00	0.0	1.3	3.993E-07	1.900E-05	4.6E-07	2.2E-05
EU2	Thorium-232	1.19	1.53	0	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU2	Uranium-234	2.07		2.07	1.270E-02	1.706E-02	0.0	0.0	5.285E-08	1.395E-07	1.1E-07	2.9E-07
EU2	Uranium-235	0.28	0.21	0.073	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	1.6E-07	1.6E-07
EU2	Uranium-238	1.92	2.88	0	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	0.0E+00	0.0E+00
						Total Dose =	**0.9**	**2.0**		**Total Risk =**	**1.5E-05**	**3.2E-05**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU3	Actinium-227	0.36	0.61	0	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	0.0E+00	0.0E+00
EU3	Protactinium-231	1.85	1.82	0.03	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	9.8E-08	2.4E-07
EU3	Lead-210	0.53		0.53	2.184E-01	5.375E-15	0.1	0.0	5.958E-07	1.467E-20	3.2E-07	7.8E-21
EU3	Radium-226	1.43	1.42	0.01	3.022E+00	2.070E+00	0.0	0.0	5.369E-05	3.467E-05	5.4E-07	3.5E-07
EU3	Radium-228	0.96	1.41	0	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-228	1.18	1.53	0	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-230	2.45	2.56	0	2.752E-02	1.135E+00	0.0	0.0	3.993E-07	1.900E-05	0.0E+00	0.0E+00
EU3	Thorium-232	1.01	1.53	0	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU3	Uranium-234	1.95		1.95	1.270E-02	1.706E-02	0.0	0.0	5.285E-08	1.395E-07	1.0E-07	2.7E-07
EU3	Uranium-235	0.23	0.21	0.021	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	4.7E-08	4.7E-08
EU3	Uranium-238	1.62	2.88	0	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	0.0E+00	0.0E+00
						Total Dose =	**0.2**	**0.1**		**Total Risk =**	**1.1E-06**	**9.0E-07**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU4	Actinium-227	0.45	0.61	0	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	0.0E+00	0.0E+00
EU4	Protactinium-231	1.43	1.82	0	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	0.0E+00	0.0E+00
EU4	Lead-210	0.00		0	2.184E-01	5.375E-15	0.0	0.0	5.958E-07	1.467E-20	0.0E+00	0.0E+00
EU4	Radium-226	1.83	1.42	0.41	3.022E+00	2.070E+00	1.2	0.8	5.369E-05	3.467E-05	2.2E-05	1.4E-05
EU4	Radium-228	0.75	1.41	0	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-228	1.27	1.53	0	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-230	2.90	2.56	0.34	2.752E-02	1.135E+00	0.0	0.4	3.993E-07	1.900E-05	1.4E-07	6.5E-06
EU4	Thorium-232	0.99	1.53	0	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU4	Uranium-234	0.00		0	1.270E-02	1.706E-02	0.0	0.0	5.285E-08	1.395E-07	0.0E+00	0.0E+00
EU4	Uranium-235	0.25	0.21	0.04	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	9.0E-08	8.9E-08
EU4	Uranium-238	2.57	2.88	0	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	0.0E+00	0.0E+00
						Total Dose =	**1.3**	**1.2**		**Total Risk =**	**2.2E-05**	**2.1E-05**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I Painseville Post Excavation Dose and Risk Estimates by Exposure Unit and Receptor, Subsistence Farmer Excavation

Post Excavation Residential Dose and Risk Estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU5	Actinium-227	0.23	0.61	0	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	0.0E+00	0.0E+00
EU5	Protactinium-231	1.20	1.82	0	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	0.0E+00	0.0E+00
EU5	Lead-210	0.00		0	2.184E-01	5.375E-15	0.0	0.0	5.958E-07	1.467E-20	0.0E+00	0.0E+00
EU5	Radium-226	1.64	1.42	0.22	3.022E+00	2.070E+00	0.7	0.5	5.369E-05	3.467E-05	1.2E-05	7.6E-06
EU5	Radium-228	1.12	1.41	0	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-228	1.24	1.53	0	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-230	2.63	2.56	0.07	2.752E-02	1.135E+00	0.0	0.1	3.993E-07	1.900E-05	2.8E-08	1.3E-06
EU5	Thorium-232	1.20	1.53	0	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU5	Uranium-234	0.00		0	1.270E-02	1.706E-02	0.0	0.0	5.285E-08	1.395E-07	0.0E+00	0.0E+00
EU5	Uranium-235	0.23	0.21	0.024	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	5.4E-08	5.3E-08
EU5	Uranium-238	2.02	2.88	0	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	0.0E+00	0.0E+00
						Total Dose =	**0.7**	**0.5**		**Total Risk =**	**1.2E-05**	**9.0E-06**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU6	Actinium-227	0.59	0.61	0	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	0.0E+00	0.0E+00
EU6	Protactinium-231	1.82	1.82	0	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	0.0E+00	0.0E+00
EU6	Lead-210	0.00		0	2.184E-01	5.375E-15	0.0	0.0	5.958E-07	1.467E-20	0.0E+00	0.0E+00
EU6	Radium-226	2.22	1.42	0.8	3.022E+00	2.070E+00	2.4	1.7	5.369E-05	3.467E-05	4.3E-05	2.8E-05
EU6	Radium-228	1.16	1.41	0	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-228	1.33	1.53	0	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-230	2.86	2.56	0.3	2.752E-02	1.135E+00	0.0	0.3	3.993E-07	1.900E-05	1.2E-07	5.7E-06
EU6	Thorium-232	1.39	1.53	0	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU6	Uranium-234	0.00		0	1.270E-02	1.706E-02	0.0	0.0	5.285E-08	1.395E-07	0.0E+00	0.0E+00
EU6	Uranium-235	0.35	0.21	0.136	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	3.1E-07	3.0E-07
EU6	Uranium-238	3.97	2.88	1.09	4.822E-02	4.425E-02	0.1	0.0	5.937E-07	5.446E-07	6.5E-07	5.9E-07
						Total Dose =	**2.5**	**2.1**		**Total Risk =**	**4.4E-05**	**3.4E-05**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU7	Actinium-227	0.00	0.61	0	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	0.0E+00	0.0E+00
EU7	Protactinium-231	0.00	1.82	0	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	0.0E+00	0.0E+00
EU7	Lead-210	0.00		0	2.184E-01	5.375E-15	0.0	0.0	5.958E-07	1.467E-20	0.0E+00	0.0E+00
EU7	Radium-226	1.18	1.42	0	3.022E+00	2.070E+00	0.0	0.0	5.369E-05	3.467E-05	0.0E+00	0.0E+00
EU7	Radium-228	1.06	1.41	0	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-228	1.05	1.53	0	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-230	1.43	2.56	0	2.752E-02	1.135E+00	0.0	0.0	3.993E-07	1.900E-05	0.0E+00	0.0E+00
EU7	Thorium-232	1.01	1.53	0	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU7	Uranium-234	1.44		1.44	1.270E-02	1.706E-02	0.0	0.0	5.285E-08	1.395E-07	7.6E-08	2.0E-07
EU7	Uranium-235	0.11	0.21	0	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	0.0E+00	0.0E+00
EU7	Uranium-238	1.52	2.88	0	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	0.0E+00	0.0E+00
						Total Dose =	**0.0**	**0.0**		**Total Risk =**	**7.6E-08**	**2.0E-07**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU8	Actinium-227	0.63	0.61	0.022	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	1.1E-07	1.6E-21
EU8	Protactinium-231	1.85	1.82	0.03	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	9.8E-08	2.4E-07
EU8	Lead-210	0.00		0	2.184E-01	5.375E-15	0.0	0.0	5.958E-07	1.467E-20	0.0E+00	0.0E+00
EU8	Radium-226	1.46	1.42	0.04	3.022E+00	2.070E+00	0.1	0.1	5.369E-05	3.467E-05	2.1E-06	1.4E-06
EU8	Radium-228	1.16	1.41	0	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-228	1.35	1.53	0	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-230	2.18	2.56	0	2.752E-02	1.135E+00	0.0	0.0	3.993E-07	1.900E-05	0.0E+00	0.0E+00
EU8	Thorium-232	1.26	1.53	0	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU8	Uranium-234	3.47		3.47	1.270E-02	1.706E-02	0.0	0.1	5.285E-08	1.395E-07	1.8E-07	4.8E-07
EU8	Uranium-235	0.36	0.21	0.148	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	3.3E-07	3.3E-07
EU8	Uranium-238	2.16	2.88	0	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	0.0E+00	0.0E+00
						Total Dose =	**0.2**	**0.2**		**Total Risk =**	**2.9E-06**	**2.4E-06**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I Painseville Post Excavation Dose and Risk Estimates by Exposure Unit and Receptor, Subsistence Farmer Excavation

Post excavation industrial risk and dose estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
					Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU1	Actinium-227	0.37	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU1	Protactinium-231	1.06	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU1	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU1	Radium-226	1.53	1.42	0.11	1.634E+00	1.068E+00	0.2	0.1	3.092E-05	1.987E-05	3.4E-06	2.2E-06
EU1	Radium-228	1.12	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-228	1.36	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-230	2.08	2.56	0	8.793E-03	5.814E-01	0.0	0.0	4.077E-08	1.087E-05	0.0E+00	0.0E+00
EU1	Thorium-232	1.22	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU1	Uranium-234	4.58		4.58	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	1.2E-07	3.5E-07
EU1	Uranium-235	0.22	0.21	0.009	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	1.8E-08	1.8E-08
EU1	Uranium-238	2.18	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**0.2**	**0.1**		**Total Risk =**	**3.5E-06**	**2.6E-06**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
					Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU2	Actinium-227	0.60	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU2	Protactinium-231	1.85	1.82	0.03	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	1.7E-08	1.7E-07
EU2	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU2	Radium-226	1.69	1.42	0.27	1.634E+00	1.068E+00	0.4	0.3	3.092E-05	1.987E-05	8.3E-06	5.4E-06
EU2	Radium-228	1.21	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-228	1.36	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-230	3.71	2.56	1.15	8.793E-03	5.814E-01	0.0	0.7	4.077E-08	1.087E-05	4.7E-08	1.3E-05
EU2	Thorium-232	1.19	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU2	Uranium-234	2.07		2.07	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	5.4E-08	1.6E-07
EU2	Uranium-235	0.28	0.21	0.073	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	1.5E-07	1.4E-07
EU2	Uranium-238	1.92	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**0.5**	**1.0**		**Total Risk =**	**8.6E-06**	**1.8E-05**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
					Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU3	Actinium-227	0.36	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU3	Protactinium-231	1.85	1.82	0.03	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	1.7E-08	1.7E-07
EU3	Lead-210	0.53		0.53	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	1.9E-07	3.2E-21
EU3	Radium-226	1.43	1.42	0.01	1.634E+00	1.068E+00	0.0	0.0	3.092E-05	1.987E-05	3.1E-07	2.0E-07
EU3	Radium-228	0.96	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-228	1.18	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-230	2.45	2.56	0	8.793E-03	5.814E-01	0.0	0.0	4.077E-08	1.087E-05	0.0E+00	0.0E+00
EU3	Thorium-232	1.01	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU3	Uranium-234	1.95		1.95	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	5.0E-08	1.5E-07
EU3	Uranium-235	0.23	0.21	0.021	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	4.3E-08	4.2E-08
EU3	Uranium-238	1.62	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**0.0**	**0.0**		**Total Risk =**	**6.1E-07**	**5.6E-07**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
					Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU4	Actinium-227	0.45	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU4	Protactinium-231	1.43	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU4	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU4	Radium-226	1.83	1.42	0.41	1.634E+00	1.068E+00	0.7	0.4	3.092E-05	1.987E-05	1.3E-05	8.1E-06
EU4	Radium-228	0.75	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-228	1.27	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-230	2.90	2.56	0.34	8.793E-03	5.814E-01	0.0	0.2	4.077E-08	1.087E-05	1.4E-08	3.7E-06
EU4	Thorium-232	0.99	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU4	Uranium-234	0.00		0	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	0.0E+00	0.0E+00
EU4	Uranium-235	0.25	0.21	0.04	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	8.1E-08	7.9E-08
EU4	Uranium-238	2.57	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**0.7**	**0.6**		**Total Risk =**	**1.3E-05**	**1.2E-05**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I Painseville Post Excavation Dose and Risk Estimates by Exposure Unit and Receptor, Subsistence Farmer Excavation

Post excavation industrial risk and dose estimates

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU5	Actinium-227	0.23	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU5	Protactinium-231	1.20	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU5	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU5	Radium-226	1.64	1.42	0.22	1.634E+00	1.068E+00	0.4	0.2	3.092E-05	1.987E-05	6.8E-06	4.4E-06
EU5	Radium-228	1.12	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-228	1.24	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-230	2.63	2.56	0.07	8.793E-03	5.814E-01	0.0	0.0	4.077E-08	1.087E-05	2.9E-09	7.6E-07
EU5	Thorium-232	1.20	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU5	Uranium-234	0.00		0	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	0.0E+00	0.0E+00
EU5	Uranium-235	0.23	0.21	0.024	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	4.9E-08	4.7E-08
EU5	Uranium-238	2.02	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**0.4**	**0.3**		**Total Risk =**	**6.9E-06**	**5.2E-06**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU6	Actinium-227	0.59	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU6	Protactinium-231	1.82	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU6	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU6	Radium-226	2.22	1.42	0.8	1.634E+00	1.068E+00	1.3	0.9	3.092E-05	1.987E-05	2.5E-05	1.6E-05
EU6	Radium-228	1.16	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-228	1.33	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-230	2.86	2.56	0.3	8.793E-03	5.814E-01	0.0	0.2	4.077E-08	1.087E-05	1.2E-08	3.3E-06
EU6	Thorium-232	1.39	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU6	Uranium-234	0.00		0	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	0.0E+00	0.0E+00
EU6	Uranium-235	0.35	0.21	0.136	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	2.8E-07	2.7E-07
EU6	Uranium-238	3.97	2.88	1.09	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	4.8E-07	4.4E-07
						Total Dose =	**1.4**	**1.1**		**Total Risk =**	**2.6E-05**	**2.0E-05**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU7	Actinium-227	0.00	0.61	0	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	0.0E+00	0.0E+00
EU7	Protactinium-231	0.00	1.82	0	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	0.0E+00	0.0E+00
EU7	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU7	Radium-226	1.18	1.42	0	1.634E+00	1.068E+00	0.0	0.0	3.092E-05	1.987E-05	0.0E+00	0.0E+00
EU7	Radium-228	1.06	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-228	1.05	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-230	1.43	2.56	0	8.793E-03	5.814E-01	0.0	0.0	4.077E-08	1.087E-05	0.0E+00	0.0E+00
EU7	Thorium-232	1.01	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU7	Uranium-234	1.44		1.44	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	3.7E-08	1.1E-07
EU7	Uranium-235	0.11	0.21	0	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	0.0E+00	0.0E+00
EU7	Uranium-238	1.52	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**0.0**	**0.0**		**Total Risk =**	**3.7E-08**	**1.1E-07**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU8	Actinium-227	0.63	0.61	0.022	4.744E-01	6.686E-15	0.0	0.0	5.604E-06	5.447E-20	1.2E-07	1.2E-21
EU8	Protactinium-231	1.85	1.82	0.03	1.113E-01	5.449E-01	0.0	0.0	5.781E-07	5.751E-06	1.7E-08	1.7E-07
EU8	Lead-210	0.00		0	3.786E-02	9.321E-16	0.0	0.0	3.575E-07	6.117E-21	0.0E+00	0.0E+00
EU8	Radium-226	1.46	1.42	0.04	1.634E+00	1.068E+00	0.1	0.0	3.092E-05	1.987E-05	1.2E-06	7.9E-07
EU8	Radium-228	1.16	1.41	0	1.055E+00	0.000E+00	0.0	0.0	1.672E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-228	1.35	1.53	0	1.254E+00	0.000E+00	0.0	0.0	2.840E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-230	2.18	2.56	0	8.793E-03	5.814E-01	0.0	0.0	4.077E-08	1.087E-05	0.0E+00	0.0E+00
EU8	Thorium-232	1.26	1.53	0	1.018E-01	2.354E+00	0.0	0.0	4.890E-08	4.410E-05	0.0E+00	0.0E+00
EU8	Uranium-234	3.47		3.47	3.717E-03	6.174E-03	0.0	0.0	2.587E-08	7.576E-08	9.0E-08	2.6E-07
EU8	Uranium-235	0.36	0.21	0.148	1.153E-01	1.168E-01	0.0	0.0	2.029E-06	1.979E-06	3.0E-07	2.9E-07
EU8	Uranium-238	2.16	2.88	0	2.545E-02	2.335E-02	0.0	0.0	4.447E-07	4.079E-07	0.0E+00	0.0E+00
						Total Dose =	**0.1**	**0.1**		**Total Risk =**	**1.8E-06**	**1.5E-06**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I Painseville Post Excavation Dose and Risk Estimates by Exposure Unit and Receptor, Subsistence Farmer Excavation

Subsistence Farmer Dose and Risk Estimates

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU1	Actinium-227	0.37	0.61	0	3.674E+00	5.176E-14	0.0	0.0	1.594E-05	2.247E-19	0.0E+00	0.0E+00
EU1	Protactinium-231	1.06	1.82	0	6.505E+00	9.468E+00	0.0	0.0	1.502E-05	2.879E-05	0.0E+00	0.0E+00
EU1	Lead-210	0.00		0	4.042E+00	9.950E-14	0.0	0.0	3.728E-05	9.176E-19	0.0E+00	0.0E+00
EU1	Radium-226	1.53	1.42	0.11	8.180E+00	7.823E+00	0.9	0.9	1.717E-04	1.336E-04	1.9E-05	1.5E-05
EU1	Radium-228	1.12	1.41	0	6.333E+00	0.000E+00	0.0	0.0	7.222E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-228	1.36	1.53	0	4.075E+00	0.000E+00	0.0	0.0	1.018E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-230	2.08	2.56	0	6.689E-02	4.211E+00	0.0	0.0	1.527E-06	7.272E-05	0.0E+00	0.0E+00
EU1	Thorium-232	1.22	1.53	0	6.860E-01	1.083E+01	0.0	0.0	1.876E-04	2.636E-04	0.0E+00	0.0E+00
EU1	Uranium-234	4.58		4.58	5.505E-02	7.025E-02	0.3	0.3	5.672E-07	8.657E-07	2.6E-06	4.0E-06
EU1	Uranium-235	0.22	0.21	0.009	4.110E-01	5.736E-01	0.0	0.0	8.300E-06	8.206E-06	7.5E-08	7.4E-08
EU1	Uranium-238	2.18	2.88	0	1.227E-01	8.268E-02	0.0	0.0	2.300E-06	1.548E-06	0.0E+00	0.0E+00
						Total Dose =	**1.2**	**1.2**		**Total Risk =**	**2.2E-05**	**1.9E-05**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU2	Actinium-227	0.60	0.61	0	3.674E+00	5.176E-14	0.0	0.0	1.594E-05	2.247E-19	0.0E+00	0.0E+00
EU2	Protactinium-231	1.85	1.82	0.03	6.505E+00	9.468E+00	0.2	0.3	1.502E-05	2.879E-05	4.5E-07	8.6E-07
EU2	Lead-210	0.00		0	4.042E+00	9.950E-14	0.0	0.0	3.728E-05	9.176E-19	0.0E+00	0.0E+00
EU2	Radium-226	1.69	1.42	0.27	8.180E+00	7.823E+00	2.2	2.1	1.717E-04	1.336E-04	4.6E-05	3.6E-05
EU2	Radium-228	1.21	1.41	0	6.333E+00	0.000E+00	0.0	0.0	7.222E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-228	1.36	1.53	0	4.075E+00	0.000E+00	0.0	0.0	1.018E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-230	3.71	2.56	1.15	6.689E-02	4.211E+00	0.1	4.8	1.527E-06	7.272E-05	1.8E-06	8.4E-05
EU2	Thorium-232	1.19	1.53	0	6.860E-01	1.083E+01	0.0	0.0	1.876E-04	2.636E-04	0.0E+00	0.0E+00
EU2	Uranium-234	2.07		2.07	5.505E-02	7.025E-02	0.1	0.1	5.672E-07	8.657E-07	1.2E-06	1.8E-06
EU2	Uranium-235	0.28	0.21	0.073	4.110E-01	5.736E-01	0.0	0.0	8.300E-06	8.206E-06	6.1E-07	6.0E-07
EU2	Uranium-238	1.92	2.88	0	1.227E-01	8.268E-02	0.0	0.0	2.300E-06	1.548E-06	0.0E+00	0.0E+00
						Total Dose =	**2.6**	**7.4**		**Total Risk =**	**5.0E-05**	**1.2E-04**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU3	Actinium-227	0.36	0.61	0	3.674E+00	5.176E-14	0.0	0.0	1.594E-05	2.247E-19	0.0E+00	0.0E+00
EU3	Protactinium-231	1.85	1.82	0.03	6.505E+00	9.468E+00	0.2	0.3	1.502E-05	2.879E-05	4.5E-07	8.6E-07
EU3	Lead-210	0.53		0.53	4.042E+00	9.950E-14	2.1	0.0	3.728E-05	9.176E-19	2.0E-05	4.9E-19
EU3	Radium-226	1.43	1.42	0.01	8.180E+00	7.823E+00	0.1	0.1	1.717E-04	1.336E-04	1.7E-06	1.3E-06
EU3	Radium-228	0.96	1.41	0	6.333E+00	0.000E+00	0.0	0.0	7.222E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-228	1.18	1.53	0	4.075E+00	0.000E+00	0.0	0.0	1.018E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-230	2.45	2.56	0	6.689E-02	4.211E+00	0.0	0.0	1.527E-06	7.272E-05	0.0E+00	0.0E+00
EU3	Thorium-232	1.01	1.53	0	6.860E-01	1.083E+01	0.0	0.0	1.876E-04	2.636E-04	0.0E+00	0.0E+00
EU3	Uranium-234	1.95		1.95	5.505E-02	7.025E-02	0.1	0.1	5.672E-07	8.657E-07	1.1E-06	1.7E-06
EU3	Uranium-235	0.23	0.21	0.021	4.110E-01	5.736E-01	0.0	0.0	8.300E-06	8.206E-06	1.7E-07	1.7E-07
EU3	Uranium-238	1.62	2.88	0	1.227E-01	8.268E-02	0.0	0.0	2.300E-06	1.548E-06	0.0E+00	0.0E+00
						Total Dose =	**2.5**	**0.5**		**Total Risk =**	**2.3E-05**	**4.1E-06**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU4	Actinium-227	0.45	0.61	0	3.674E+00	5.176E-14	0.0	0.0	1.594E-05	2.247E-19	0.0E+00	0.0E+00
EU4	Protactinium-231	1.43	1.82	0	6.505E+00	9.468E+00	0.0	0.0	1.502E-05	2.879E-05	0.0E+00	0.0E+00
EU4	Lead-210	0.00		0	4.042E+00	9.950E-14	0.0	0.0	3.728E-05	9.176E-19	0.0E+00	0.0E+00
EU4	Radium-226	1.83	1.42	0.41	8.180E+00	7.823E+00	3.4	3.2	1.717E-04	1.336E-04	7.0E-05	5.5E-05
EU4	Radium-228	0.75	1.41	0	6.333E+00	0.000E+00	0.0	0.0	7.222E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-228	1.27	1.53	0	4.075E+00	0.000E+00	0.0	0.0	1.018E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-230	2.90	2.56	0.34	6.689E-02	4.211E+00	0.0	1.4	1.527E-06	7.272E-05	5.2E-07	2.5E-05
EU4	Thorium-232	0.99	1.53	0	6.860E-01	1.083E+01	0.0	0.0	1.876E-04	2.636E-04	0.0E+00	0.0E+00
EU4	Uranium-234	0.00		0	5.505E-02	7.025E-02	0.0	0.0	5.672E-07	8.657E-07	0.0E+00	0.0E+00
EU4	Uranium-235	0.25	0.21	0.04	4.110E-01	5.736E-01	0.0	0.0	8.300E-06	8.206E-06	3.3E-07	3.3E-07
EU4	Uranium-238	2.57	2.88	0	1.227E-01	8.268E-02	0.0	0.0	2.300E-06	1.548E-06	0.0E+00	0.0E+00
						Total Dose =	**3.4**	**4.7**		**Total Risk =**	**7.1E-05**	**8.0E-05**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I Painseville Post Excavation Dose and Risk Estimates by Exposure Unit and Receptor, Subsistence Farmer Excavation

Subsistence Farmer Dose and Risk Estimates

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU5	Actinium-227	0.23	0.61	0	3.674E+00	5.176E-14	0.0	0.0	1.594E-05	2.247E-19	0.0E+00	0.0E+00
EU5	Protactinium-231	1.20	1.82	0	6.505E+00	9.468E+00	0.0	0.0	1.502E-05	2.879E-05	0.0E+00	0.0E+00
EU5	Lead-210	0.00		0	4.042E+00	9.950E-14	0.0	0.0	3.728E-05	9.176E-19	0.0E+00	0.0E+00
EU5	Radium-226	1.64	1.42	0.22	8.180E+00	7.823E+00	1.8	1.7	1.717E-04	1.336E-04	3.8E-05	2.9E-05
EU5	Radium-228	1.12	1.41	0	6.333E+00	0.000E+00	0.0	0.0	7.222E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-228	1.24	1.53	0	4.075E+00	0.000E+00	0.0	0.0	1.018E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-230	2.63	2.56	0.07	6.689E-02	4.211E+00	0.0	0.3	1.527E-06	7.272E-05	1.1E-07	5.1E-06
EU5	Thorium-232	1.20	1.53	0	6.860E-01	1.083E+01	0.0	0.0	1.876E-04	2.636E-04	0.0E+00	0.0E+00
EU5	Uranium-234	0.00		0	5.505E-02	7.025E-02	0.0	0.0	5.672E-07	8.657E-07	0.0E+00	0.0E+00
EU5	Uranium-235	0.23	0.21	0.024	4.110E-01	5.736E-01	0.0	0.0	8.300E-06	8.206E-06	2.0E-07	2.0E-07
EU5	Uranium-238	2.02	2.88	0	1.227E-01	8.268E-02	0.0	0.0	2.300E-06	1.548E-06	0.0E+00	0.0E+00
						Total Dose =	**1.8**	**2.0**		**Total Risk =**	**3.8E-05**	**3.5E-05**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU6	Actinium-227	0.59	0.61	0	3.674E+00	5.176E-14	0.0	0.0	1.594E-05	2.247E-19	0.0E+00	0.0E+00
EU6	Protactinium-231	1.82	1.82	0	6.505E+00	9.468E+00	0.0	0.0	1.502E-05	2.879E-05	0.0E+00	0.0E+00
EU6	Lead-210	0.00		0	4.042E+00	9.950E-14	0.0	0.0	3.728E-05	9.176E-19	0.0E+00	0.0E+00
EU6	Radium-226	2.22	1.42	0.8	8.180E+00	7.823E+00	6.5	6.3	1.717E-04	1.336E-04	1.4E-04	1.1E-04
EU6	Radium-228	1.16	1.41	0	6.333E+00	0.000E+00	0.0	0.0	7.222E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-228	1.33	1.53	0	4.075E+00	0.000E+00	0.0	0.0	1.018E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-230	2.86	2.56	0.3	6.689E-02	4.211E+00	0.0	1.3	1.527E-06	7.272E-05	4.6E-07	2.2E-05
EU6	Thorium-232	1.39	1.53	0	6.860E-01	1.083E+01	0.0	0.0	1.876E-04	2.636E-04	0.0E+00	0.0E+00
EU6	Uranium-234	0.00		0	5.505E-02	7.025E-02	0.0	0.0	5.672E-07	8.657E-07	0.0E+00	0.0E+00
EU6	Uranium-235	0.35	0.21	0.136	4.110E-01	5.736E-01	0.1	0.1	8.300E-06	8.206E-06	1.1E-06	1.1E-06
EU6	Uranium-238	3.97	2.88	1.09	1.227E-01	8.268E-02	0.1	0.1	2.300E-06	1.548E-06	2.5E-06	1.7E-06
						Total Dose =	**6.8**	**7.7**		**Total Risk =**	**1.4E-04**	**1.3E-04**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU7	Actinium-227	0.00	0.61	0	3.674E+00	5.176E-14	0.0	0.0	1.594E-05	2.247E-19	0.0E+00	0.0E+00
EU7	Protactinium-231	0.00	1.82	0	6.505E+00	9.468E+00	0.0	0.0	1.502E-05	2.879E-05	0.0E+00	0.0E+00
EU7	Lead-210	0.00		0	4.042E+00	9.950E-14	0.0	0.0	3.728E-05	9.176E-19	0.0E+00	0.0E+00
EU7	Radium-226	1.18	1.42	0	8.180E+00	7.823E+00	0.0	0.0	1.717E-04	1.336E-04	0.0E+00	0.0E+00
EU7	Radium-228	1.06	1.41	0	6.333E+00	0.000E+00	0.0	0.0	7.222E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-228	1.05	1.53	0	4.075E+00	0.000E+00	0.0	0.0	1.018E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-230	1.43	2.56	0	6.689E-02	4.211E+00	0.0	0.0	1.527E-06	7.272E-05	0.0E+00	0.0E+00
EU7	Thorium-232	1.01	1.53	0	6.860E-01	1.083E+01	0.0	0.0	1.876E-04	2.636E-04	0.0E+00	0.0E+00
EU7	Uranium-234	1.44		1.44	5.505E-02	7.025E-02	0.1	0.1	5.672E-07	8.657E-07	8.2E-07	1.2E-06
EU7	Uranium-235	0.11	0.21	0	4.110E-01	5.736E-01	0.0	0.0	8.300E-06	8.206E-06	0.0E+00	0.0E+00
EU7	Uranium-238	1.52	2.88	0	1.227E-01	8.268E-02	0.0	0.0	2.300E-06	1.548E-06	0.0E+00	0.0E+00
						Total Dose =	**0.1**	**0.1**		**Total Risk =**	**8.2E-07**	**1.2E-06**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU8	Actinium-227	0.63	0.61	0.022	3.674E+00	5.176E-14	0.1	0.0	1.594E-05	2.247E-19	3.5E-07	4.9E-21
EU8	Protactinium-231	1.85	1.82	0.03	6.505E+00	9.468E+00	0.2	0.3	1.502E-05	2.879E-05	4.5E-07	8.6E-07
EU8	Lead-210	0.00		0	4.042E+00	9.950E-14	0.0	0.0	3.728E-05	9.176E-19	0.0E+00	0.0E+00
EU8	Radium-226	1.46	1.42	0.04	8.180E+00	7.823E+00	0.3	0.3	1.717E-04	1.336E-04	6.9E-06	5.3E-06
EU8	Radium-228	1.16	1.41	0	6.333E+00	0.000E+00	0.0	0.0	7.222E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-228	1.35	1.53	0	4.075E+00	0.000E+00	0.0	0.0	1.018E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-230	2.18	2.56	0	6.689E-02	4.211E+00	0.0	0.0	1.527E-06	7.272E-05	0.0E+00	0.0E+00
EU8	Thorium-232	1.26	1.53	0	6.860E-01	1.083E+01	0.0	0.0	1.876E-04	2.636E-04	0.0E+00	0.0E+00
EU8	Uranium-234	3.47		3.47	5.505E-02	7.025E-02	0.2	0.2	5.672E-07	8.657E-07	2.0E-06	3.0E-06
EU8	Uranium-235	0.36	0.21	0.148	4.110E-01	5.736E-01	0.1	0.1	8.300E-06	8.206E-06	1.2E-06	1.2E-06
EU8	Uranium-238	2.16	2.88	0	1.227E-01	8.268E-02	0.0	0.0	2.300E-06	1.548E-06	0.0E+00	0.0E+00
						Total Dose =	**0.9**	**0.9**		**Total Risk =**	**1.1E-05**	**1.0E-05**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I
Painseville Dose and Risk Estimates by Exposure Unit

Industrial Dose and Risk Estimates

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU1	Actinium-227	0.97	0.61	0.36	4.744E-01	6.686E-15	0.2	0.0	2.421E-06	3.412E-20	8.7E-07	1.2E-20
EU1	Protactinium-231	1.92	1.82	0.10	1.113E-01	5.449E-01	0.0	0.1	1.218E-06	3.385E-06	1.2E-07	3.4E-07
EU1	Lead-210	58.90		58.90	3.786E-02	9.321E-16	2.2	0.0	9.093E-08	2.239E-21	5.4E-06	1.3E-19
EU1	Radium-226	58.90	1.42	57.48	1.634E+00	1.068E+00	93.9	61.4	2.427E-05	1.556E-05	1.4E-03	8.9E-04
EU1	Radium-228	1.09	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-228	2.22	1.53	0.69	1.254E+00	0.000E+00	0.9	0.0	2.500E-06	0.000E+00	1.7E-06	0.0E+00
EU1	Thorium-230	37.40	2.56	34.84	8.793E-03	5.814E-01	0.3	20.3	1.437E-07	8.493E-06	5.0E-06	3.0E-04
EU1	Thorium-232	2.36	1.53	0.83	1.018E-01	2.354E+00	0.1	2.0	2.140E-05	3.382E-05	1.8E-05	2.8E-05
EU1	Uranium-234	40.20		40.20	3.717E-03	6.174E-03	0.1	0.2	1.156E-08	5.120E-08	4.6E-07	2.1E-06
EU1	Uranium-235	1.53	0.21	1.32	1.153E-01	1.168E-01	0.2	0.2	1.008E-06	9.938E-07	1.3E-06	1.3E-06
EU1	Uranium-238	15.00	2.88	12.12	2.327E-02	2.135E-02	0.3	0.3	2.526E-07	2.317E-07	3.1E-06	2.8E-06
						Total Dose =	**98.2**	**84.3**		**Total Risk =**	**1.4E-03**	**1.2E-03**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU2	Actinium-227	0.92	0.61	0.31	4.744E-01	6.686E-15	0.1	0.0	2.421E-06	3.412E-20	7.5E-07	1.1E-20
EU2	Protactinium-231	2.74	1.82	0.92	1.113E-01	5.449E-01	0.1	0.5	1.218E-06	3.385E-06	1.1E-06	3.1E-06
EU2	Lead-210	10.60		10.60	3.786E-02	9.321E-16	0.4	0.0	9.093E-08	2.239E-21	9.6E-07	2.4E-20
EU2	Radium-226	10.60	1.42	9.18	1.634E+00	1.068E+00	15.0	9.8	2.427E-05	1.556E-05	2.2E-04	1.4E-04
EU2	Radium-228	1.06	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-228	1.72	1.53	0.19	1.254E+00	0.000E+00	0.2	0.0	2.500E-06	0.000E+00	4.8E-07	0.0E+00
EU2	Thorium-230	10.50	2.56	7.94	8.793E-03	5.814E-01	0.1	4.6	1.437E-07	8.493E-06	1.1E-06	6.7E-05
EU2	Thorium-232	1.14	1.53	0.00	1.018E-01	2.354E+00	0.0	0.0	2.140E-05	3.382E-05	0.0E+00	0.0E+00
EU2	Uranium-234	8.33		8.33	3.717E-03	6.174E-03	0.0	0.1	1.156E-08	5.120E-08	9.6E-08	4.3E-07
EU2	Uranium-235	0.94	0.21	0.73	1.153E-01	1.168E-01	0.1	0.1	1.008E-06	9.938E-07	7.4E-07	7.3E-07
EU2	Uranium-238	4.89	2.88	2.01	2.327E-02	2.135E-02	0.0	0.0	2.526E-07	2.317E-07	5.1E-07	4.7E-07
						Total Dose =	**16.1**	**15.1**		**Total Risk =**	**2.3E-04**	**2.2E-04**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU3	Actinium-227	1.48	0.61	0.87	4.744E-01	6.686E-15	0.4	0.0	2.421E-06	3.412E-20	2.1E-06	3.0E-20
EU3	Protactinium-231	2.17	1.82	0.35	1.113E-01	5.449E-01	0.0	0.2	1.218E-06	3.385E-06	4.3E-07	1.2E-06
EU3	Lead-210	27.60		27.60	3.786E-02	9.321E-16	1.0	0.0	9.093E-08	2.239E-21	2.5E-06	6.2E-20
EU3	Radium-226	27.60	1.42	26.18	1.634E+00	1.068E+00	42.8	28.0	2.427E-05	1.556E-05	6.4E-04	4.1E-04
EU3	Radium-228	0.88	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-228	9.00	1.53	7.47	1.254E+00	0.000E+00	9.4	0.0	2.500E-06	0.000E+00	1.9E-05	0.0E+00
EU3	Thorium-230	41.00	2.56	38.44	8.793E-03	5.814E-01	0.3	22.3	1.437E-07	8.493E-06	5.5E-06	3.3E-04
EU3	Thorium-232	1.27	1.53	0.00	1.018E-01	2.354E+00	0.0	0.0	2.140E-05	3.382E-05	0.0E+00	0.0E+00
EU3	Uranium-234	364.00		364.00	3.717E-03	6.174E-03	1.4	2.2	1.156E-08	5.120E-08	4.2E-06	1.9E-05
EU3	Uranium-235	3.38	0.21	3.17	1.153E-01	1.168E-01	0.4	0.4	1.008E-06	9.938E-07	3.2E-06	3.2E-06
EU3	Uranium-238	29.00	2.88	26.12	2.327E-02	2.135E-02	0.6	0.6	2.526E-07	2.317E-07	6.6E-06	6.1E-06
						Total Dose =	**56.3**	**53.7**		**Total Risk =**	**6.8E-04**	**7.6E-04**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU4	Actinium-227	0.46	0.61	0.00	4.744E-01	6.686E-15	0.0	0.0	2.421E-06	3.412E-20	0.0E+00	0.0E+00
EU4	Protactinium-231	1.74	1.82	0.00	1.113E-01	5.449E-01	0.0	0.0	1.218E-06	3.385E-06	0.0E+00	0.0E+00
EU4	Lead-210	12.70		12.70	3.786E-02	9.321E-16	0.5	0.0	9.093E-08	2.239E-21	1.2E-06	2.8E-20
EU4	Radium-226	12.70	1.42	11.28	1.634E+00	1.068E+00	18.4	12.0	2.427E-05	1.556E-05	2.7E-04	1.8E-04
EU4	Radium-228	0.79	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-228	1.61	1.53	0.08	1.254E+00	0.000E+00	0.1	0.0	2.500E-06	0.000E+00	2.0E-07	0.0E+00
EU4	Thorium-230	18.30	2.56	15.74	8.793E-03	5.814E-01	0.1	9.2	1.437E-07	8.493E-06	2.3E-06	1.3E-04
EU4	Thorium-232	1.55	1.53	0.02	1.018E-01	2.354E+00	0.0	0.0	2.140E-05	3.382E-05	4.3E-07	6.8E-07
EU4	Uranium-234	5.21		5.21	3.717E-03	6.174E-03	0.0	0.0	1.156E-08	5.120E-08	6.0E-08	2.7E-07
EU4	Uranium-235	0.60	0.21	0.39	1.153E-01	1.168E-01	0.0	0.0	1.008E-06	9.938E-07	4.0E-07	3.9E-07
EU4	Uranium-238	3.42	2.88	0.54	2.327E-02	2.135E-02	0.0	0.0	2.526E-07	2.317E-07	1.4E-07	1.3E-07
						Total Dose =	**19.2**	**21.3**		**Total Risk =**	**2.8E-04**	**3.1E-04**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I

Painseville Dose and Risk Estimates by Exposure Unit

Industrial Dose and Risk Estimates

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU5	Actinium-227	0.95	0.61	0.34	4.744E-01	6.686E-15	0.2	0.0	2.421E-06	3.412E-20	8.3E-07	1.2E-20
EU5	Protactinium-231	2.50	1.82	0.68	1.113E-01	5.449E-01	0.1	0.4	1.218E-06	3.385E-06	8.3E-07	2.3E-06
EU5	Lead-210	15.00		15.00	3.786E-02	9.321E-16	0.6	0.0	9.093E-08	2.239E-21	1.4E-06	3.4E-20
EU5	Radium-226	15.00	1.42	13.58	1.634E+00	1.068E+00	22.2	14.5	2.427E-05	1.556E-05	3.3E-04	2.1E-04
EU5	Radium-228	1.13	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-228	2.23	1.53	0.70	1.254E+00	0.000E+00	0.9	0.0	2.500E-06	0.000E+00	1.8E-06	0.0E+00
EU5	Thorium-230	13.50	2.56	10.94	8.793E-03	5.814E-01	0.1	6.4	1.437E-07	8.493E-06	1.6E-06	9.3E-05
EU5	Thorium-232	1.69	1.53	0.16	1.018E-01	2.354E+00	0.0	0.4	2.140E-05	3.382E-05	3.4E-06	5.4E-06
EU5	Uranium-234	3.71		3.71	3.717E-03	6.174E-03	0.0	0.0	1.156E-08	5.120E-08	4.3E-08	1.9E-07
EU5	Uranium-235	0.92	0.21	0.71	1.153E-01	1.168E-01	0.1	0.1	1.008E-06	9.938E-07	7.1E-07	7.0E-07
EU5	Uranium-238	6.26	2.88	3.38	2.327E-02	2.135E-02	0.1	0.1	2.526E-07	2.317E-07	8.5E-07	7.8E-07
						Total Dose =	**24.2**	**21.8**		**Total Risk =**	**3.4E-04**	**3.1E-04**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU6	Actinium-227	2.91	0.61	2.30	4.744E-01	6.686E-15	1.1	0.0	2.421E-06	3.412E-20	5.6E-06	7.8E-20
EU6	Protactinium-231	18.40	1.82	16.58	1.113E-01	5.449E-01	1.8	9.0	1.218E-06	3.385E-06	2.0E-05	5.6E-05
EU6	Lead-210	88.50		88.50	3.786E-02	9.321E-16	3.4	0.0	9.093E-08	2.239E-21	8.0E-06	2.0E-19
EU6	Radium-226	88.50	1.42	87.08	1.634E+00	1.068E+00	142.3	93.0	2.427E-05	1.556E-05	2.1E-03	1.4E-03
EU6	Radium-228	1.18	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-228	1.94	1.53	0.41	1.254E+00	0.000E+00	0.5	0.0	2.500E-06	0.000E+00	1.0E-06	0.0E+00
EU6	Thorium-230	196.00	2.56	193.44	8.793E-03	5.814E-01	1.7	112.5	1.437E-07	8.493E-06	2.8E-05	1.6E-03
EU6	Thorium-232	2.04	1.53	0.51	1.018E-01	2.354E+00	0.1	1.2	2.140E-05	3.382E-05	1.1E-05	1.7E-05
EU6	Uranium-234	43.90		43.90	3.717E-03	6.174E-03	0.2	0.3	1.156E-08	5.120E-08	5.1E-07	2.2E-06
EU6	Uranium-235	3.97	0.21	3.76	1.153E-01	1.168E-01	0.4	0.4	1.008E-06	9.938E-07	3.8E-06	3.7E-06
EU6	Uranium-238	32.70	2.88	29.82	2.327E-02	2.135E-02	0.7	0.6	2.526E-07	2.317E-07	7.5E-06	6.9E-06
						Total Dose =	**152.1**	**217.0**		**Total Risk =**	**2.2E-03**	**3.1E-03**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU7	Actinium-227	0.00	0.61	0.00	4.744E-01	6.686E-15	0.0	0.0	2.421E-06	3.412E-20	0.0E+00	0.0E+00
EU7	Protactinium-231	0.00	1.82	0.00	1.113E-01	5.449E-01	0.0	0.0	1.218E-06	3.385E-06	0.0E+00	0.0E+00
EU7	Lead-210	1.39		1.39	3.786E-02	9.321E-16	0.1	0.0	9.093E-08	2.239E-21	1.3E-07	3.1E-21
EU7	Radium-226	1.39	1.42	0.00	1.634E+00	1.068E+00	0.0	0.0	2.427E-05	1.556E-05	0.0E+00	0.0E+00
EU7	Radium-228	1.24	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-228	1.22	1.53	0.00	1.254E+00	0.000E+00	0.0	0.0	2.500E-06	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-230	1.48	2.56	0.00	8.793E-03	5.814E-01	0.0	0.0	1.437E-07	8.493E-06	0.0E+00	0.0E+00
EU7	Thorium-232	1.06	1.53	0.00	1.018E-01	2.354E+00	0.0	0.0	2.140E-05	3.382E-05	0.0E+00	0.0E+00
EU7	Uranium-234	1.43		1.43	3.717E-03	6.174E-03	0.0	0.0	1.156E-08	5.120E-08	1.7E-08	7.3E-08
EU7	Uranium-235	0.13	0.21	0.00	1.153E-01	1.168E-01	0.0	0.0	1.008E-06	9.938E-07	0.0E+00	0.0E+00
EU7	Uranium-238	1.48	2.88	0.00	2.327E-02	2.135E-02	0.0	0.0	2.526E-07	2.317E-07	0.0E+00	0.0E+00
						Total Dose =	**0.1**	**0.0**		**Total Risk =**	**1.4E-07**	**7.3E-08**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU8	Actinium-227	1.36	0.61	0.75	4.744E-01	6.686E-15	0.4	0.0	2.421E-06	3.412E-20	1.8E-06	2.6E-20
EU8	Protactinium-231	2.71	1.82	0.89	1.113E-01	5.449E-01	0.1	0.5	1.218E-06	3.385E-06	1.1E-06	3.0E-06
EU8	Lead-210	75.80		75.80	3.786E-02	9.321E-16	2.9	0.0	9.093E-08	2.239E-21	6.9E-06	1.7E-19
EU8	Radium-226	75.80	1.42	74.38	1.634E+00	1.068E+00	121.5	79.4	2.427E-05	1.556E-05	1.8E-03	1.2E-03
EU8	Radium-228	1.05	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-228	1.85	1.53	0.32	1.254E+00	0.000E+00	0.4	0.0	2.500E-06	0.000E+00	8.0E-07	0.0E+00
EU8	Thorium-230	68.30	2.56	65.74	8.793E-03	5.814E-01	0.6	38.2	1.437E-07	8.493E-06	9.4E-06	5.6E-04
EU8	Thorium-232	5.37	1.53	3.84	1.018E-01	2.354E+00	0.4	9.0	2.140E-05	3.382E-05	8.2E-05	1.3E-04
EU8	Uranium-234	21.20		21.20	3.717E-03	6.174E-03	0.1	0.1	1.156E-08	5.120E-08	2.5E-07	1.1E-06
EU8	Uranium-235	1.33	0.21	1.12	1.153E-01	1.168E-01	0.1	0.1	1.008E-06	9.938E-07	1.1E-06	1.1E-06
EU8	Uranium-238	12.40	2.88	9.52	2.327E-02	2.135E-02	0.2	0.2	2.526E-07	2.317E-07	2.4E-06	2.2E-06
						Total Dose =	**126.7**	**127.6**		**Total Risk =**	**1.9E-03**	**1.9E-03**

EPC = exposure point concentration – the lesser of the max and 95th upper confidence level
BKG – average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I
Painseville Dose and Risk Estimates by Exposure Unit

Subsistence Farmer Dose and Risk Estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU1	Actinium-227	0.97	0.61	0.36	4.344E+00	6.123E-14	1.6	0.0	1.115E-05	1.571E-19	4.0E-06	5.6E-20
EU1	Protactinium-231	1.92	1.82	0.10	1.011E+01	1.344E+01	1.0	1.3	1.382E-05	2.322E-05	1.4E-06	2.3E-06
EU1	Lead-210	58.90		58.90	6.509E+00	1.602E-13	383.4	0.0	6.038E-05	1.486E-18	3.6E-03	8.8E-17
EU1	Radium-226	58.90	1.42	57.48	7.826E+00	9.183E+00	449.8	527.8	1.547E-04	1.376E-04	8.9E-03	7.9E-03
EU1	Radium-228	1.09	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-228	2.22	1.53	0.69	2.370E+00	0.000E+00	1.6	0.0	5.891E-06	0.000E+00	4.1E-06	0.0E+00
EU1	Thorium-230	37.40	2.56	34.84	7.642E-02	4.918E+00	2.7	171.3	1.474E-06	7.451E-05	5.1E-05	2.6E-03
EU1	Thorium-232	2.36	1.53	0.83	7.617E-01	9.684E+00	0.6	8.0	1.822E-04	2.509E-04	1.5E-04	2.1E-04
EU1	Uranium-234	40.20		40.20	7.568E-02	9.237E-02	3.0	3.7	7.923E-07	1.079E-06	3.2E-05	4.3E-05
EU1	Uranium-235	1.53	0.21	1.32	2.762E-01	5.330E-01	0.4	0.7	5.213E-06	5.261E-06	6.9E-06	6.9E-06
EU1	Uranium-238	15.00	2.88	12.12	1.081E-01	9.931E-02	1.3	1.2	1.915E-06	1.758E-06	2.3E-05	2.1E-05
						Total Dose =	**845.4**	**714.2**		**Total Risk =**	**1.3E-02**	**1.1E-02**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU2	Actinium-227	0.92	0.61	0.31	4.344E+00	6.123E-14	1.3	0.0	1.115E-05	1.571E-19	3.4E-06	4.9E-20
EU2	Protactinium-231	2.74	1.82	0.92	1.011E+01	1.344E+01	9.3	12.4	1.382E-05	2.322E-05	1.3E-05	2.1E-05
EU2	Lead-210	10.60		10.60	6.509E+00	1.602E-13	69.0	0.0	6.038E-05	1.486E-18	6.4E-04	1.6E-17
EU2	Radium-226	10.60	1.42	9.18	7.826E+00	9.183E+00	71.8	84.3	1.547E-04	1.376E-04	1.4E-03	1.3E-03
EU2	Radium-228	1.06	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-228	1.72	1.53	0.19	2.370E+00	0.000E+00	0.5	0.0	5.891E-06	0.000E+00	1.1E-06	0.0E+00
EU2	Thorium-230	10.50	2.56	7.94	7.642E-02	4.918E+00	0.6	39.0	1.474E-06	7.451E-05	1.2E-05	5.9E-04
EU2	Thorium-232	1.14	1.53	0.00	7.617E-01	9.684E+00	0.0	0.0	1.822E-04	2.509E-04	0.0E+00	0.0E+00
EU2	Uranium-234	8.33		8.33	7.568E-02	9.237E-02	0.6	0.8	7.923E-07	1.079E-06	6.6E-06	9.0E-06
EU2	Uranium-235	0.94	0.21	0.73	2.762E-01	5.330E-01	0.2	0.4	5.213E-06	5.261E-06	3.8E-06	3.9E-06
EU2	Uranium-238	4.89	2.88	2.01	1.081E-01	9.931E-02	0.2	0.2	1.915E-06	1.758E-06	3.8E-06	3.5E-06
						Total Dose =	**153.6**	**137.1**		**Total Risk =**	**2.1E-03**	**1.9E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU3	Actinium-227	1.48	0.61	0.87	4.344E+00	6.123E-14	3.8	0.0	1.115E-05	1.571E-19	9.7E-06	1.4E-19
EU3	Protactinium-231	2.17	1.82	0.35	1.011E+01	1.344E+01	3.5	4.7	1.382E-05	2.322E-05	4.8E-06	8.1E-06
EU3	Lead-210	27.60		27.60	6.509E+00	1.602E-13	179.6	0.0	6.038E-05	1.486E-18	1.7E-03	4.1E-17
EU3	Radium-226	27.60	1.42	26.18	7.826E+00	9.183E+00	204.9	240.4	1.547E-04	1.376E-04	4.1E-03	3.6E-03
EU3	Radium-228	0.88	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-228	9.00	1.53	7.47	2.370E+00	0.000E+00	17.7	0.0	5.891E-06	0.000E+00	4.4E-05	0.0E+00
EU3	Thorium-230	41.00	2.56	38.44	7.642E-02	4.918E+00	2.9	189.0	1.474E-06	7.451E-05	5.7E-05	2.9E-03
EU3	Thorium-232	1.27	1.53	0.00	7.617E-01	9.684E+00	0.0	0.0	1.822E-04	2.509E-04	0.0E+00	0.0E+00
EU3	Uranium-234	364.00		364.00	7.568E-02	9.237E-02	27.5	33.6	7.923E-07	1.079E-06	2.9E-04	3.9E-04
EU3	Uranium-235	3.38	0.21	3.17	2.762E-01	5.330E-01	0.9	1.7	5.213E-06	5.261E-06	1.7E-05	1.7E-05
EU3	Uranium-238	29.00	2.88	26.12	1.081E-01	9.931E-02	2.8	2.6	1.915E-06	1.758E-06	5.0E-05	4.6E-05
						Total Dose =	**443.7**	**472.1**		**Total Risk =**	**6.2E-03**	**6.9E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU4	Actinium-227	0.46	0.61	0.00	4.344E+00	6.123E-14	0.0	0.0	1.115E-05	1.571E-19	0.0E+00	0.0E+00
EU4	Protactinium-231	1.74	1.82	0.00	1.011E+01	1.344E+01	0.0	0.0	1.382E-05	2.322E-05	0.0E+00	0.0E+00
EU4	Lead-210	12.70		12.70	6.509E+00	1.602E-13	82.7	0.0	6.038E-05	1.486E-18	7.7E-04	1.9E-17
EU4	Radium-226	12.70	1.42	11.28	7.826E+00	9.183E+00	88.3	103.6	1.547E-04	1.376E-04	1.7E-03	1.6E-03
EU4	Radium-228	0.79	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-228	1.61	1.53	0.08	2.370E+00	0.000E+00	0.2	0.0	5.891E-06	0.000E+00	4.7E-07	0.0E+00
EU4	Thorium-230	18.30	2.56	15.74	7.642E-02	4.918E+00	1.2	77.4	1.474E-06	7.451E-05	2.3E-05	1.2E-03
EU4	Thorium-232	1.55	1.53	0.02	7.617E-01	9.684E+00	0.0	0.2	1.822E-04	2.509E-04	3.6E-06	5.0E-06
EU4	Uranium-234	5.21		5.21	7.568E-02	9.237E-02	0.4	0.5	7.923E-07	1.079E-06	4.1E-06	5.6E-06
EU4	Uranium-235	0.60	0.21	0.39	2.762E-01	5.330E-01	0.1	0.2	5.213E-06	5.261E-06	2.0E-06	2.1E-06
EU4	Uranium-238	3.42	2.88	0.54	1.081E-01	9.931E-02	0.1	0.1	1.915E-06	1.758E-06	1.0E-06	9.5E-07
						Total Dose =	**172.9**	**181.9**		**Total Risk =**	**2.5E-03**	**2.7E-03**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I
Painseville Dose and Risk Estimates by Exposure Unit

Subsistence Farmer Dose and Risk Estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU5	Actinium-227	0.95	0.61	0.34	4.344E+00	6.123E-14	1.5	0.0	1.115E-05	1.571E-19	3.8E-06	5.4E-20
EU5	Protactinium-231	2.50	1.82	0.68	1.011E+01	1.344E+01	6.9	9.1	1.382E-05	2.322E-05	9.4E-06	1.6E-05
EU5	Lead-210	15.00		15.00	6.509E+00	1.602E-13	97.6	0.0	6.038E-05	1.486E-18	9.1E-04	2.2E-17
EU5	Radium-226	15.00	1.42	13.58	7.826E+00	9.183E+00	106.3	124.7	1.547E-04	1.376E-04	2.1E-03	1.9E-03
EU5	Radium-228	1.13	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-228	2.23	1.53	0.70	2.370E+00	0.000E+00	1.7	0.0	5.891E-06	0.000E+00	4.1E-06	0.0E+00
EU5	Thorium-230	13.50	2.56	10.94	7.642E-02	4.918E+00	0.8	53.8	1.474E-06	7.451E-05	1.6E-05	8.2E-04
EU5	Thorium-232	1.69	1.53	0.16	7.617E-01	9.684E+00	0.1	1.5	1.822E-04	2.509E-04	2.9E-05	4.0E-05
EU5	Uranium-234	3.71		3.71	7.568E-02	9.237E-02	0.3	0.3	7.923E-07	1.079E-06	2.9E-06	4.0E-06
EU5	Uranium-235	0.92	0.21	0.71	2.762E-01	5.330E-01	0.2	0.4	5.213E-06	5.261E-06	3.7E-06	3.7E-06
EU5	Uranium-238	6.26	2.88	3.38	1.081E-01	9.931E-02	0.4	0.3	1.915E-06	1.758E-06	6.5E-06	5.9E-06
						Total Dose =	**215.7**	**190.3**		**Total Risk =**	**3.1E-03**	**2.8E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU6	Actinium-227	2.91	0.61	2.30	4.344E+00	6.123E-14	10.0	0.0	1.115E-05	1.571E-19	2.6E-05	3.6E-19
EU6	Protactinium-231	18.40	1.82	16.58	1.011E+01	1.344E+01	167.6	222.8	1.382E-05	2.322E-05	2.3E-04	3.8E-04
EU6	Lead-210	88.50		88.50	6.509E+00	1.602E-13	576.0	0.0	6.038E-05	1.486E-18	5.3E-03	1.3E-16
EU6	Radium-226	88.50	1.42	87.08	7.826E+00	9.183E+00	681.5	799.7	1.547E-04	1.376E-04	1.3E-02	1.2E-02
EU6	Radium-228	1.18	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-228	1.94	1.53	0.41	2.370E+00	0.000E+00	1.0	0.0	5.891E-06	0.000E+00	2.4E-06	0.0E+00
EU6	Thorium-230	196.00	2.56	193.44	7.642E-02	4.918E+00	14.8	951.3	1.474E-06	7.451E-05	2.9E-04	1.4E-02
EU6	Thorium-232	2.04	1.53	0.51	7.617E-01	9.684E+00	0.4	4.9	1.822E-04	2.509E-04	9.3E-05	1.3E-04
EU6	Uranium-234	43.90		43.90	7.568E-02	9.237E-02	3.3	4.1	7.923E-07	1.079E-06	3.5E-05	4.7E-05
EU6	Uranium-235	3.97	0.21	3.76	2.762E-01	5.330E-01	1.0	2.0	5.213E-06	5.261E-06	2.0E-05	2.0E-05
EU6	Uranium-238	32.70	2.88	29.82	1.081E-01	9.931E-02	3.2	3.0	1.915E-06	1.758E-06	5.7E-05	5.2E-05
						Total Dose =	**1458.9**	**1987.8**		**Total Risk =**	**2.0E-02**	**2.7E-02**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU7	Actinium-227	0.00	0.61	0.00	4.344E+00	6.123E-14	0.0	0.0	1.115E-05	1.571E-19	0.0E+00	0.0E+00
EU7	Protactinium-231	0.00	1.82	0.00	1.011E+01	1.344E+01	0.0	0.0	1.382E-05	2.322E-05	0.0E+00	0.0E+00
EU7	Lead-210	1.39		1.39	6.509E+00	1.602E-13	9.0	0.0	6.038E-05	1.486E-18	8.4E-05	2.1E-18
EU7	Radium-226	1.39	1.42	0.00	7.826E+00	9.183E+00	0.0	0.0	1.547E-04	1.376E-04	0.0E+00	0.0E+00
EU7	Radium-228	1.24	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-228	1.22	1.53	0.00	2.370E+00	0.000E+00	0.0	0.0	5.891E-06	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-230	1.48	2.56	0.00	7.642E-02	4.918E+00	0.0	0.0	1.474E-06	7.451E-05	0.0E+00	0.0E+00
EU7	Thorium-232	1.06	1.53	0.00	7.617E-01	9.684E+00	0.0	0.0	1.822E-04	2.509E-04	0.0E+00	0.0E+00
EU7	Uranium-234	1.43		1.43	7.568E-02	9.237E-02	0.1	0.1	7.923E-07	1.079E-06	1.1E-06	1.5E-06
EU7	Uranium-235	0.13	0.21	0.00	2.762E-01	5.330E-01	0.0	0.0	5.213E-06	5.261E-06	0.0E+00	0.0E+00
EU7	Uranium-238	1.48	2.88	0.00	1.081E-01	9.931E-02	0.0	0.0	1.915E-06	1.758E-06	0.0E+00	0.0E+00
						Total Dose =	**9.2**	**0.1**		**Total Risk =**	**8.5E-05**	**1.5E-06**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU8	Actinium-227	1.36	0.61	0.75	4.344E+00	6.123E-14	3.3	0.0	1.115E-05	1.571E-19	8.4E-06	1.2E-19
EU8	Protactinium-231	2.71	1.82	0.89	1.011E+01	1.344E+01	9.0	12.0	1.382E-05	2.322E-05	1.2E-05	2.1E-05
EU8	Lead-210	75.80		75.80	6.509E+00	1.602E-13	493.4	0.0	6.038E-05	1.486E-18	4.6E-03	1.1E-16
EU8	Radium-226	75.80	1.42	74.38	7.826E+00	9.183E+00	582.1	683.0	1.547E-04	1.376E-04	1.2E-02	1.0E-02
EU8	Radium-228	1.05	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-228	1.85	1.53	0.32	2.370E+00	0.000E+00	0.8	0.0	5.891E-06	0.000E+00	1.9E-06	0.0E+00
EU8	Thorium-230	68.30	2.56	65.74	7.642E-02	4.918E+00	5.0	323.3	1.474E-06	7.451E-05	9.7E-05	4.9E-03
EU8	Thorium-232	5.37	1.53	3.84	7.617E-01	9.684E+00	2.9	37.2	1.822E-04	2.509E-04	7.0E-04	9.6E-04
EU8	Uranium-234	21.20		21.20	7.568E-02	9.237E-02	1.6	2.0	7.923E-07	1.079E-06	1.7E-05	2.3E-05
EU8	Uranium-235	1.33	0.21	1.12	2.762E-01	5.330E-01	0.3	0.6	5.213E-06	5.261E-06	5.8E-06	5.9E-06
EU8	Uranium-238	12.40	2.88	9.52	1.081E-01	9.931E-02	1.0	0.9	1.915E-06	1.758E-06	1.8E-05	1.7E-05
						Total Dose =	**1099.4**	**1059.0**		**Total Risk =**	**1.7E-02**	**1.6E-02**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I

Painseville Dose and Risk Estimates by Exposure Unit

(0-10 ft)

Residential Dose and Risk Estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU1	Actinium-227	0.67	0.61	0.06	1.172E+00	1.652E-14	0.1	0.0	5.222E-06	7.360E-20	3.2E-07	4.5E-21
EU1	Protactinium-231	1.06	1.82	0.00	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	0.0E+00	0.0E+00
EU1	Lead-210	31.50		31.50	2.184E-01	5.375E-15	6.9	0.0	5.958E-07	1.467E-20	1.9E-05	4.6E-19
EU1	Radium-226	31.50	1.42	30.08	3.022E+00	2.070E+00	90.9	62.3	5.369E-05	3.467E-05	1.6E-03	1.0E-03
EU1	Radium-228	1.13	1.41	0.00	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-228	1.79	1.53	0.26	2.310E+00	0.000E+00	0.6	0.0	4.589E-06	0.000E+00	1.2E-06	0.0E+00
EU1	Thorium-230	18.50	2.56	15.94	2.752E-02	1.135E+00	0.4	18.1	3.993E-07	1.900E-05	6.4E-06	3.0E-04
EU1	Thorium-232	1.75	1.53	0.22	2.452E-01	4.412E+00	0.1	1.0	5.147E-05	7.462E-05	1.1E-05	1.6E-05
EU1	Uranium-234	35.10		35.10	1.270E-02	1.706E-02	0.4	0.6	5.285E-08	1.395E-07	1.9E-06	4.9E-06
EU1	Uranium-235	0.92	0.21	0.71	2.166E-01	2.292E-01	0.2	0.2	2.244E-06	2.220E-06	1.6E-06	1.6E-06
EU1	Uranium-238	12.60	2.88	9.72	4.822E-02	4.425E-02	0.5	0.4	5.937E-07	5.446E-07	5.8E-06	5.3E-06
						Total Dose =	**100.0**	**82.5**		**Total Risk =**	**1.7E-03**	**1.4E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU2	Actinium-227	0.73	0.61	0.12	1.172E+00	1.652E-14	0.1	0.0	5.222E-06	7.360E-20	6.4E-07	9.1E-21
EU2	Protactinium-231	2.21	1.82	0.39	4.294E-01	1.490E+00	0.2	0.6	3.259E-06	7.889E-06	1.3E-06	3.1E-06
EU2	Lead-210	4.75		4.75	2.184E-01	5.375E-15	1.0	0.0	5.958E-07	1.467E-20	2.8E-06	7.0E-20
EU2	Radium-226	4.75	1.42	3.33	3.022E+00	2.070E+00	10.1	6.9	5.369E-05	3.467E-05	1.8E-04	1.2E-04
EU2	Radium-228	1.03	1.41	0.00	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-228	1.39	1.53	0.00	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-230	10.50	2.56	7.94	2.752E-02	1.135E+00	0.2	9.0	3.993E-07	1.900E-05	3.2E-06	1.5E-04
EU2	Thorium-232	1.10	1.53	0.00	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU2	Uranium-234	8.33		8.33	1.270E-02	1.706E-02	0.1	0.1	5.285E-08	1.395E-07	4.4E-07	1.2E-06
EU2	Uranium-235	0.62	0.21	0.41	2.166E-01	2.292E-01	0.1	0.1	2.244E-06	2.220E-06	9.2E-07	9.1E-07
EU2	Uranium-238	3.65	2.88	0.77	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	4.6E-07	4.2E-07
						Total Dose =	**11.9**	**16.8**		**Total Risk =**	**1.9E-04**	**2.7E-04**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU3	Actinium-227	1.03	0.61	0.42	1.172E+00	1.652E-14	0.5	0.0	5.222E-06	7.360E-20	2.2E-06	3.1E-20
EU3	Protactinium-231	2.17	1.82	0.35	4.294E-01	1.490E+00	0.2	0.5	3.259E-06	7.889E-06	1.1E-06	2.8E-06
EU3	Lead-210	19.90		19.90	2.184E-01	5.375E-15	4.3	0.0	5.958E-07	1.467E-20	1.2E-05	2.9E-19
EU3	Radium-226	19.90	1.42	18.48	3.022E+00	2.070E+00	55.8	38.3	5.369E-05	3.467E-05	9.9E-04	6.4E-04
EU3	Radium-228	0.91	1.41	0.00	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-228	6.51	1.53	4.98	2.310E+00	0.000E+00	11.5	0.0	4.589E-06	0.000E+00	2.3E-05	0.0E+00
EU3	Thorium-230	28.30	2.56	25.74	2.752E-02	1.135E+00	0.7	29.2	3.993E-07	1.900E-05	1.0E-05	4.9E-04
EU3	Thorium-232	1.23	1.53	0.00	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU3	Uranium-234	81.70		81.70	1.270E-02	1.706E-02	1.0	1.4	5.285E-08	1.395E-07	4.3E-06	1.1E-05
EU3	Uranium-235	2.91	0.21	2.70	2.166E-01	2.292E-01	0.6	0.6	2.244E-06	2.220E-06	6.1E-06	6.0E-06
EU3	Uranium-238	21.00	2.88	18.12	4.822E-02	4.425E-02	0.9	0.8	5.937E-07	5.446E-07	1.1E-05	9.9E-06
						Total Dose =	**75.5**	**70.8**		**Total Risk =**	**1.1E-03**	**1.2E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU4	Actinium-227	0.46	0.61	0.00	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	0.0E+00	0.0E+00
EU4	Protactinium-231	1.63	1.82	0.00	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	0.0E+00	0.0E+00
EU4	Lead-210	8.57		8.57	2.184E-01	5.375E-15	1.9	0.0	5.958E-07	1.467E-20	5.1E-06	1.3E-19
EU4	Radium-226	8.57	1.42	7.15	3.022E+00	2.070E+00	21.6	14.8	5.369E-05	3.467E-05	3.8E-04	2.5E-04
EU4	Radium-228	0.80	1.41	0.00	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-228	1.38	1.53	0.00	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-230	11.30	2.56	8.74	2.752E-02	1.135E+00	0.2	9.9	3.993E-07	1.900E-05	3.5E-06	1.7E-04
EU4	Thorium-232	1.36	1.53	0.00	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU4	Uranium-234	5.21		5.21	1.270E-02	1.706E-02	0.1	0.1	5.285E-08	1.395E-07	2.8E-07	7.3E-07
EU4	Uranium-235	0.40	0.21	0.19	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	4.2E-07	4.1E-07
EU4	Uranium-238	2.94	2.88	0.06	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	3.6E-08	3.3E-08
						Total Dose =	**23.8**	**24.9**		**Total Risk =**	**3.9E-04**	**4.2E-04**

EPC – exposure point concentration = the lesser of the max and 95% upper confidence level
BKG – average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I
Painseville Dose and Risk Estimates by Exposure Unit
(0-10 ft)

Residential Dose and Risk Estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU5	Actinium-227	0.73	0.61	0.12	1.172E+00	1.652E-14	0.1	0.0	5.222E-06	7.360E-20	6.4E-07	9.0E-21
EU5	Protactinium-231	1.95	1.82	0.13	4.294E-01	1.490E+00	0.1	0.2	3.259E-06	7.889E-06	4.2E-07	1.0E-06
EU5	Lead-210	5.50		5.50	2.184E-01	5.375E-15	1.2	0.0	5.958E-07	1.467E-20	3.3E-06	8.1E-20
EU5	Radium-226	5.50	1.42	4.08	3.022E+00	2.070E+00	12.3	8.4	5.369E-05	3.467E-05	2.2E-04	1.4E-04
EU5	Radium-228	1.10	1.41	0.00	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-228	1.80	1.53	0.27	2.310E+00	0.000E+00	0.6	0.0	4.589E-06	0.000E+00	1.2E-06	0.0E+00
EU5	Thorium-230	10.30	2.56	7.74	2.752E-02	1.135E+00	0.2	8.8	3.993E-07	1.900E-05	3.1E-06	1.5E-04
EU5	Thorium-232	1.36	1.53	0.00	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU5	Uranium-234	3.71		3.71	1.270E-02	1.706E-02	0.0	0.1	5.285E-08	1.395E-07	2.0E-07	5.2E-07
EU5	Uranium-235	0.63	0.21	0.42	2.166E-01	2.292E-01	0.1	0.1	2.244E-06	2.220E-06	9.5E-07	9.4E-07
EU5	Uranium-238	4.61	2.88	1.73	4.822E-02	4.425E-02	0.1	0.1	5.937E-07	5.446E-07	1.0E-06	9.4E-07
						Total Dose =	**14.8**	**17.7**		**Total Risk =**	**2.3E-04**	**2.9E-04**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU6	Actinium-227	2.46	0.61	1.85	1.172E+00	1.652E-14	2.2	0.0	5.222E-06	7.360E-20	9.7E-06	1.4E-19
EU6	Protactinium-231	10.40	1.82	8.58	4.294E-01	1.490E+00	3.7	12.8	3.259E-06	7.889E-06	2.8E-05	6.8E-05
EU6	Lead-210	125.00		125.00	2.184E-01	5.375E-15	27.3	0.0	5.958E-07	1.467E-20	7.4E-05	1.8E-18
EU6	Radium-226	125.00	1.42	123.58	3.022E+00	2.070E+00	373.5	255.8	5.369E-05	3.467E-05	6.6E-03	4.3E-03
EU6	Radium-228	1.18	1.41	0.00	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-228	1.55	1.53	0.02	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	9.2E-08	0.0E+00
EU6	Thorium-230	102.00	2.56	99.44	2.752E-02	1.135E+00	2.7	112.9	3.993E-07	1.900E-05	4.0E-05	1.9E-03
EU6	Thorium-232	2.05	1.53	0.52	2.452E-01	4.412E+00	0.1	2.3	5.147E-05	7.462E-05	2.7E-05	3.9E-05
EU6	Uranium-234	43.90		43.90	1.270E-02	1.706E-02	0.6	0.7	5.285E-08	1.395E-07	2.3E-06	6.1E-06
EU6	Uranium-235	4.73	0.21	4.52	2.166E-01	2.292E-01	1.0	1.0	2.244E-06	2.220E-06	1.0E-05	1.0E-05
EU6	Uranium-238	19.90	2.88	17.02	4.822E-02	4.425E-02	0.8	0.8	5.937E-07	5.446E-07	1.0E-05	9.3E-06
						Total Dose =	**411.9**	**386.3**		**Total Risk =**	**6.8E-03**	**6.3E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU7	Actinium-227	0.00	0.61	0.00	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	0.0E+00	0.0E+00
EU7	Protactinium-231	0.00	1.82	0.00	4.294E-01	1.490E+00	0.0	0.0	3.259E-06	7.889E-06	0.0E+00	0.0E+00
EU7	Lead-210	2.17		2.17	2.184E-01	5.375E-15	0.5	0.0	5.958E-07	1.467E-20	1.3E-06	3.2E-20
EU7	Radium-226	2.17	1.42	0.75	3.022E+00	2.070E+00	2.3	1.6	5.369E-05	3.467E-05	4.0E-05	2.6E-05
EU7	Radium-228	1.21	1.41	0.00	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-228	1.09	1.53	0.00	2.310E+00	0.000E+00	0.0	0.0	4.589E-06	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-230	1.78	2.56	0.00	2.752E-02	1.135E+00	0.0	0.0	3.993E-07	1.900E-05	0.0E+00	0.0E+00
EU7	Thorium-232	1.03	1.53	0.00	2.452E-01	4.412E+00	0.0	0.0	5.147E-05	7.462E-05	0.0E+00	0.0E+00
EU7	Uranium-234	1.78		1.78	1.270E-02	1.706E-02	0.0	0.0	5.285E-08	1.395E-07	9.4E-08	2.5E-07
EU7	Uranium-235	0.12	0.21	0.00	2.166E-01	2.292E-01	0.0	0.0	2.244E-06	2.220E-06	0.0E+00	0.0E+00
EU7	Uranium-238	1.81	2.88	0.00	4.822E-02	4.425E-02	0.0	0.0	5.937E-07	5.446E-07	0.0E+00	0.0E+00
						Total Dose =	**2.8**	**1.6**		**Total Risk =**	**4.2E-05**	**2.6E-05**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU8	Actinium-227	0.63	0.61	0.02	1.172E+00	1.652E-14	0.0	0.0	5.222E-06	7.360E-20	1.3E-07	1.8E-21
EU8	Protactinium-231	1.92	1.82	0.10	4.294E-01	1.490E+00	0.0	0.1	3.259E-06	7.889E-06	3.3E-07	7.9E-07
EU8	Lead-210	15.20		15.20	2.184E-01	5.375E-15	3.3	0.0	5.958E-07	1.467E-20	9.1E-06	2.2E-19
EU8	Radium-226	15.20	1.42	13.78	3.022E+00	2.070E+00	41.6	28.5	5.369E-05	3.467E-05	7.4E-04	4.8E-04
EU8	Radium-228	1.07	1.41	0.00	1.963E+00	0.000E+00	0.0	0.0	2.037E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-228	1.85	1.53	0.32	2.310E+00	0.000E+00	0.7	0.0	4.589E-06	0.000E+00	1.5E-06	0.0E+00
EU8	Thorium-230	14.70	2.56	12.14	2.752E-02	1.135E+00	0.3	13.8	3.993E-07	1.900E-05	4.8E-06	2.3E-04
EU8	Thorium-232	3.31	1.53	1.78	2.452E-01	4.412E+00	0.4	7.9	5.147E-05	7.462E-05	9.2E-05	1.3E-04
EU8	Uranium-234	9.64		9.64	1.270E-02	1.706E-02	0.1	0.2	5.285E-08	1.395E-07	5.1E-07	1.3E-06
EU8	Uranium-235	1.12	0.21	0.91	2.166E-01	2.292E-01	0.2	0.2	2.244E-06	2.220E-06	2.0E-06	2.0E-06
EU8	Uranium-238	6.15	2.88	3.27	4.822E-02	4.425E-02	0.2	0.1	5.937E-07	5.446E-07	1.9E-06	1.8E-06
						Total Dose =	**47.0**	**50.8**		**Total Risk =**	**8.5E-04**	**8.5E-04**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I
Painseville Dose and Risk Estimates by Exposure Unit
(0-10 ft)

Industrial Dose and Risk Estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU1	Actinium-227	0.67	0.61	0.06	4.744E-01	6.686E-15	0.0	0.0	2.421E-06	3.412E-20	1.5E-07	2.1E-21
EU1	Protactinium-231	1.06	1.82	0.00	1.113E-01	5.449E-01	0.0	0.0	1.218E-06	3.385E-06	0.0E+00	0.0E+00
EU1	Lead-210	31.50		31.50	3.786E-02	9.321E-16	1.2	0.0	9.093E-08	2.239E-21	2.9E-06	7.1E-20
EU1	Radium-226	31.50	1.42	30.08	1.634E+00	1.068E+00	49.2	32.1	2.427E-05	1.556E-05	7.3E-04	4.7E-04
EU1	Radium-228	1.13	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-228	1.79	1.53	0.26	1.254E+00	0.000E+00	0.3	0.0	2.500E-06	0.000E+00	6.5E-07	0.0E+00
EU1	Thorium-230	18.50	2.56	15.94	8.793E-03	5.814E-01	0.1	9.3	1.437E-07	8.493E-06	2.3E-06	1.4E-04
EU1	Thorium-232	1.75	1.53	0.22	1.018E-01	2.354E+00	0.0	0.5	2.140E-05	3.382E-05	4.7E-06	7.4E-06
EU1	Uranium-234	35.10		35.10	3.717E-03	6.174E-03	0.1	0.2	1.156E-08	5.120E-08	4.1E-07	1.8E-06
EU1	Uranium-235	0.92	0.21	0.71	1.153E-01	1.168E-01	0.1	0.1	1.008E-06	9.938E-07	7.1E-07	7.0E-07
EU1	Uranium-238	12.60	2.88	9.72	2.327E-02	2.135E-02	0.2	0.2	2.526E-07	2.317E-07	2.5E-06	2.3E-06
						Total Dose =	**51.3**	**42.4**		**Total Risk =**	**7.4E-04**	**6.2E-04**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU2	Actinium-227	0.73	0.61	0.12	4.744E-01	6.686E-15	0.1	0.0	2.421E-06	3.412E-20	3.0E-07	4.2E-21
EU2	Protactinium-231	2.21	1.82	0.39	1.113E-01	5.449E-01	0.0	0.2	1.218E-06	3.385E-06	4.8E-07	1.3E-06
EU2	Lead-210	4.75		4.75	3.786E-02	9.321E-16	0.2	0.0	9.093E-08	2.239E-21	4.3E-07	1.1E-20
EU2	Radium-226	4.75	1.42	3.33	1.634E+00	1.068E+00	5.4	3.6	2.427E-05	1.556E-05	8.1E-05	5.2E-05
EU2	Radium-228	1.03	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-228	1.39	1.53	0.00	1.254E+00	0.000E+00	0.0	0.0	2.500E-06	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-230	10.50	2.56	7.94	8.793E-03	5.814E-01	0.1	4.6	1.437E-07	8.493E-06	1.1E-06	6.7E-05
EU2	Thorium-232	1.10	1.53	0.00	1.018E-01	2.354E+00	0.0	0.0	2.140E-05	3.382E-05	0.0E+00	0.0E+00
EU2	Uranium-234	8.33		8.33	3.717E-03	6.174E-03	0.0	0.1	1.156E-08	5.120E-08	9.6E-08	4.3E-07
EU2	Uranium-235	0.62	0.21	0.41	1.153E-01	1.168E-01	0.0	0.0	1.008E-06	9.938E-07	4.1E-07	4.1E-07
EU2	Uranium-238	3.65	2.88	0.77	2.327E-02	2.135E-02	0.0	0.0	2.526E-07	2.317E-07	1.9E-07	1.8E-07
						Total Dose =	**5.9**	**8.5**		**Total Risk =**	**8.4E-05**	**1.2E-04**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU3	Actinium-227	1.03	0.61	0.42	4.744E-01	6.686E-15	0.2	0.0	2.421E-06	3.412E-20	1.0E-06	1.4E-20
EU3	Protactinium-231	2.17	1.82	0.35	1.113E-01	5.449E-01	0.0	0.2	1.218E-06	3.385E-06	4.3E-07	1.2E-06
EU3	Lead-210	19.90		19.90	3.786E-02	9.321E-16	0.8	0.0	9.093E-08	2.239E-21	1.8E-06	4.5E-20
EU3	Radium-226	19.90	1.42	18.48	1.634E+00	1.068E+00	30.2	19.7	2.427E-05	1.556E-05	4.5E-04	2.9E-04
EU3	Radium-228	0.91	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-228	6.51	1.53	4.98	1.254E+00	0.000E+00	6.2	0.0	2.500E-06	0.000E+00	1.2E-05	0.0E+00
EU3	Thorium-230	28.30	2.56	25.74	8.793E-03	5.814E-01	0.2	15.0	1.437E-07	8.493E-06	3.7E-06	2.2E-04
EU3	Thorium-232	1.23	1.53	0.00	1.018E-01	2.354E+00	0.0	0.0	2.140E-05	3.382E-05	0.0E+00	0.0E+00
EU3	Uranium-234	81.70		81.70	3.717E-03	6.174E-03	0.3	0.5	1.156E-08	5.120E-08	9.4E-07	4.2E-06
EU3	Uranium-235	2.91	0.21	2.70	1.153E-01	1.168E-01	0.3	0.3	1.008E-06	9.938E-07	2.7E-06	2.7E-06
EU3	Uranium-238	21.00	2.88	18.12	2.327E-02	2.135E-02	0.4	0.4	2.526E-07	2.317E-07	4.6E-06	4.2E-06
						Total Dose =	**38.7**	**36.1**		**Total Risk =**	**4.8E-04**	**5.2E-04**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU4	Actinium-227	0.46	0.61	0.00	4.744E-01	6.686E-15	0.0	0.0	2.421E-06	3.412E-20	0.0E+00	0.0E+00
EU4	Protactinium-231	1.63	1.82	0.00	1.113E-01	5.449E-01	0.0	0.0	1.218E-06	3.385E-06	0.0E+00	0.0E+00
EU4	Lead-210	8.57		8.57	3.786E-02	9.321E-16	0.3	0.0	9.093E-08	2.239E-21	7.8E-07	1.9E-20
EU4	Radium-226	8.57	1.42	7.15	1.634E+00	1.068E+00	11.7	7.6	2.427E-05	1.556E-05	1.7E-04	1.1E-04
EU4	Radium-228	0.80	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-228	1.38	1.53	0.00	1.254E+00	0.000E+00	0.0	0.0	2.500E-06	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-230	11.30	2.56	8.74	8.793E-03	5.814E-01	0.1	5.1	1.437E-07	8.493E-06	1.3E-06	7.4E-05
EU4	Thorium-232	1.36	1.53	0.00	1.018E-01	2.354E+00	0.0	0.0	2.140E-05	3.382E-05	0.0E+00	0.0E+00
EU4	Uranium-234	5.21		5.21	3.717E-03	6.174E-03	0.0	0.0	1.156E-08	5.120E-08	6.0E-08	2.7E-07
EU4	Uranium-235	0.40	0.21	0.19	1.153E-01	1.168E-01	0.0	0.0	1.008E-06	9.938E-07	1.9E-07	1.8E-07
EU4	Uranium-238	2.94	2.88	0.06	2.327E-02	2.135E-02	0.0	0.0	2.526E-07	2.317E-07	1.5E-08	1.4E-08
						Total Dose =	**12.1**	**12.8**		**Total Risk =**	**1.8E-04**	**1.9E-04**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I
Painseville Dose and Risk Estimates by Exposure Unit
(0-10 ft)
Industrial Dose and Risk Estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU5	Actinium-227	0.73	0.61	0.12	4.744E-01	6.686E-15	0.1	0.0	2.421E-06	3.412E-20	3.0E-07	4.2E-21
EU5	Protactinium-231	1.95	1.82	0.13	1.113E-01	5.449E-01	0.0	0.1	1.218E-06	3.385E-06	1.6E-07	4.4E-07
EU5	Lead-210	5.50		5.50	3.786E-02	9.321E-16	0.2	0.0	9.093E-08	2.239E-21	5.0E-07	1.2E-20
EU5	Radium-226	5.50	1.42	4.08	1.634E+00	1.068E+00	6.7	4.4	2.427E-05	1.556E-05	9.9E-05	6.3E-05
EU5	Radium-228	1.10	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-228	1.80	1.53	0.27	1.254E+00	0.000E+00	0.3	0.0	2.500E-06	0.000E+00	6.8E-07	0.0E+00
EU5	Thorium-230	10.30	2.56	7.74	8.793E-03	5.814E-01	0.1	4.5	1.437E-07	8.493E-06	1.1E-06	6.6E-05
EU5	Thorium-232	1.36	1.53	0.00	1.018E-01	2.354E+00	0.0	0.0	2.140E-05	3.382E-05	0.0E+00	0.0E+00
EU5	Uranium-234	3.71		3.71	3.717E-03	6.174E-03	0.0	0.0	1.156E-08	5.120E-08	4.3E-08	1.9E-07
EU5	Uranium-235	0.63	0.21	0.42	1.153E-01	1.168E-01	0.0	0.0	1.008E-06	9.938E-07	4.3E-07	4.2E-07
EU5	Uranium-238	4.61	2.88	1.73	2.327E-02	2.135E-02	0.0	0.0	2.526E-07	2.317E-07	4.4E-07	4.0E-07
						Total Dose =	**7.5**	**9.0**		**Total Risk =**	**1.0E-04**	**1.3E-04**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU6	Actinium-227	2.46	0.61	1.85	4.744E-01	6.686E-15	0.9	0.0	2.421E-06	3.412E-20	4.5E-06	6.3E-20
EU6	Protactinium-231	10.40	1.82	8.58	1.113E-01	5.449E-01	1.0	4.7	1.218E-06	3.385E-06	1.0E-05	2.9E-05
EU6	Lead-210	125.00		125.00	3.786E-02	9.321E-16	4.7	0.0	9.093E-08	2.239E-21	1.1E-05	2.8E-19
EU6	Radium-226	125.00	1.42	123.58	1.634E+00	1.068E+00	201.9	132.0	2.427E-05	1.556E-05	3.0E-03	1.9E-03
EU6	Radium-228	1.18	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-228	1.55	1.53	0.02	1.254E+00	0.000E+00	0.0	0.0	2.500E-06	0.000E+00	5.0E-08	0.0E+00
EU6	Thorium-230	102.00	2.56	99.44	8.793E-03	5.814E-01	0.9	57.8	1.437E-07	8.493E-06	1.4E-05	8.4E-04
EU6	Thorium-232	2.05	1.53	0.52	1.018E-01	2.354E+00	0.1	1.2	2.140E-05	3.382E-05	1.1E-05	1.8E-05
EU6	Uranium-234	43.90		43.90	3.717E-03	6.174E-03	0.2	0.3	1.156E-08	5.120E-08	5.1E-07	2.2E-06
EU6	Uranium-235	4.73	0.21	4.52	1.153E-01	1.168E-01	0.5	0.5	1.008E-06	9.938E-07	4.6E-06	4.5E-06
EU6	Uranium-238	19.90	2.88	17.02	2.327E-02	2.135E-02	0.4	0.4	2.526E-07	2.317E-07	4.3E-06	3.9E-06
						Total Dose =	**210.5**	**196.9**		**Total Risk =**	**3.1E-03**	**2.8E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU7	Actinium-227	0.00	0.61	0.00	4.744E-01	6.686E-15	0.0	0.0	2.421E-06	3.412E-20	0.0E+00	0.0E+00
EU7	Protactinium-231	0.00	1.82	0.00	1.113E-01	5.449E-01	0.0	0.0	1.218E-06	3.385E-06	0.0E+00	0.0E+00
EU7	Lead-210	2.17		2.17	3.786E-02	9.321E-16	0.1	0.0	9.093E-08	2.239E-21	2.0E-07	4.9E-21
EU7	Radium-226	2.17	1.42	0.75	1.634E+00	1.068E+00	1.2	0.8	2.427E-05	1.556E-05	1.8E-05	1.2E-05
EU7	Radium-228	1.21	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-228	1.09	1.53	0.00	1.254E+00	0.000E+00	0.0	0.0	2.500E-06	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-230	1.78	2.56	0.00	8.793E-03	5.814E-01	0.0	0.0	1.437E-07	8.493E-06	0.0E+00	0.0E+00
EU7	Thorium-232	1.03	1.53	0.00	1.018E-01	2.354E+00	0.0	0.0	2.140E-05	3.382E-05	0.0E+00	0.0E+00
EU7	Uranium-234	1.78		1.78	3.717E-03	6.174E-03	0.0	0.0	1.156E-08	5.120E-08	2.1E-08	9.1E-08
EU7	Uranium-235	0.12	0.21	0.00	1.153E-01	1.168E-01	0.0	0.0	1.008E-06	9.938E-07	0.0E+00	0.0E+00
EU7	Uranium-238	1.81	2.88	0.00	2.327E-02	2.135E-02	0.0	0.0	2.526E-07	2.317E-07	0.0E+00	0.0E+00
						Total Dose =	**1.3**	**0.8**		**Total Risk =**	**1.8E-05**	**1.2E-05**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU8	Actinium-227	0.63	0.61	0.02	4.744E-01	6.686E-15	0.0	0.0	2.421E-06	3.412E-20	5.8E-08	8.2E-22
EU8	Protactinium-231	1.92	1.82	0.10	1.113E-01	5.449E-01	0.0	0.1	1.218E-06	3.385E-06	1.2E-07	3.4E-07
EU8	Lead-210	15.20		15.20	3.786E-02	9.321E-16	0.6	0.0	9.093E-08	2.239E-21	1.4E-06	3.4E-20
EU8	Radium-226	15.20	1.42	13.78	1.634E+00	1.068E+00	22.5	14.7	2.427E-05	1.556E-05	3.3E-04	2.1E-04
EU8	Radium-228	1.07	1.41	0.00	1.055E+00	0.000E+00	0.0	0.0	1.074E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-228	1.85	1.53	0.32	1.254E+00	0.000E+00	0.4	0.0	2.500E-06	0.000E+00	8.0E-07	0.0E+00
EU8	Thorium-230	14.70	2.56	12.14	8.793E-03	5.814E-01	0.1	7.1	1.437E-07	8.493E-06	1.7E-06	1.0E-04
EU8	Thorium-232	3.31	1.53	1.78	1.018E-01	2.354E+00	0.2	4.2	2.140E-05	3.382E-05	3.8E-05	6.0E-05
EU8	Uranium-234	9.64		9.64	3.717E-03	6.174E-03	0.0	0.1	1.156E-08	5.120E-08	1.1E-07	4.9E-07
EU8	Uranium-235	1.12	0.21	0.91	1.153E-01	1.168E-01	0.1	0.1	1.008E-06	9.938E-07	9.2E-07	9.0E-07
EU8	Uranium-238	6.15	2.88	3.27	2.327E-02	2.135E-02	0.1	0.1	2.526E-07	2.317E-07	8.3E-07	7.6E-07
						Total Dose =	**24.0**	**26.3**		**Total Risk =**	**3.8E-04**	**3.8E-04**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I
Painseville Dose and Risk Estimates by Exposure Unit
(0-10 ft)
Subsistence Farmer Dose and Risk Estimates

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU1	Actinium-227	0.67	0.61	0.06	4.344E+00	6.123E-14	0.3	0.0	1.115E-05	1.571E-19	6.8E-07	9.6E-21
EU1	Protactinium-231	1.06	1.82	0.00	1.011E+01	1.344E+01	0.0	0.0	1.382E-05	2.322E-05	0.0E+00	0.0E+00
EU1	Lead-210	31.50		31.50	6.509E+00	1.602E-13	205.0	0.0	6.038E-05	1.486E-18	1.9E-03	4.7E-17
EU1	Radium-226	31.50	1.42	30.08	7.826E+00	9.183E+00	235.4	276.2	1.547E-04	1.376E-04	4.7E-03	4.1E-03
EU1	Radium-228	1.13	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU1	Thorium-228	1.79	1.53	0.26	2.370E+00	0.000E+00	0.6	0.0	5.891E-06	0.000E+00	1.5E-06	0.0E+00
EU1	Thorium-230	18.50	2.56	15.94	7.642E-02	4.918E+00	1.2	78.4	1.474E-06	7.451E-05	2.3E-05	1.2E-03
EU1	Thorium-232	1.75	1.53	0.22	7.617E-01	9.684E+00	0.2	2.1	1.822E-04	2.509E-04	4.0E-05	5.5E-05
EU1	Uranium-234	35.10		35.10	7.568E-02	9.237E-02	2.7	3.2	7.923E-07	1.079E-06	2.8E-05	3.8E-05
EU1	Uranium-235	0.92	0.21	0.71	2.762E-01	5.330E-01	0.2	0.4	5.213E-06	5.261E-06	3.7E-06	3.7E-06
EU1	Uranium-238	12.60	2.88	9.72	1.081E-01	9.931E-02	1.1	1.0	1.915E-06	1.758E-06	1.9E-05	1.7E-05
						Total Dose =	**446.6**	**361.3**		**Total Risk =**	**6.7E-03**	**5.4E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU2	Actinium-227	0.73	0.61	0.12	4.344E+00	6.123E-14	0.5	0.0	1.115E-05	1.571E-19	1.4E-06	1.9E-20
EU2	Protactinium-231	2.21	1.82	0.39	1.011E+01	1.344E+01	3.9	5.2	1.382E-05	2.322E-05	5.4E-06	9.1E-06
EU2	Lead-210	4.75		4.75	6.509E+00	1.602E-13	30.9	0.0	6.038E-05	1.486E-18	2.9E-04	7.1E-18
EU2	Radium-226	4.75	1.42	3.33	7.826E+00	9.183E+00	26.1	30.6	1.547E-04	1.376E-04	5.2E-04	4.6E-04
EU2	Radium-228	1.03	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-228	1.39	1.53	0.00	2.370E+00	0.000E+00	0.0	0.0	5.891E-06	0.000E+00	0.0E+00	0.0E+00
EU2	Thorium-230	10.50	2.56	7.94	7.642E-02	4.918E+00	0.6	39.0	1.474E-06	7.451E-05	1.2E-05	5.9E-04
EU2	Thorium-232	1.10	1.53	0.00	7.617E-01	9.684E+00	0.0	0.0	1.822E-04	2.509E-04	0.0E+00	0.0E+00
EU2	Uranium-234	8.33		8.33	7.568E-02	9.237E-02	0.6	0.8	7.923E-07	1.079E-06	6.6E-06	9.0E-06
EU2	Uranium-235	0.62	0.21	0.41	2.762E-01	5.330E-01	0.1	0.2	5.213E-06	5.261E-06	2.1E-06	2.2E-06
EU2	Uranium-238	3.65	2.88	0.77	1.081E-01	9.931E-02	0.1	0.1	1.915E-06	1.758E-06	1.5E-06	1.4E-06
						Total Dose =	**62.9**	**75.9**		**Total Risk =**	**8.3E-04**	**1.1E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU3	Actinium-227	1.03	0.61	0.42	4.344E+00	6.123E-14	1.8	0.0	1.115E-05	1.571E-19	4.7E-06	6.6E-20
EU3	Protactinium-231	2.17	1.82	0.35	1.011E+01	1.344E+01	3.5	4.7	1.382E-05	2.322E-05	4.8E-06	8.1E-06
EU3	Lead-210	19.90		19.90	6.509E+00	1.602E-13	129.5	0.0	6.038E-05	1.486E-18	1.2E-03	3.0E-17
EU3	Radium-226	19.90	1.42	18.48	7.826E+00	9.183E+00	144.6	169.7	1.547E-04	1.376E-04	2.9E-03	2.5E-03
EU3	Radium-228	0.91	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU3	Thorium-228	6.51	1.53	4.98	2.370E+00	0.000E+00	11.8	0.0	5.891E-06	0.000E+00	2.9E-05	0.0E+00
EU3	Thorium-230	28.30	2.56	25.74	7.642E-02	4.918E+00	2.0	126.6	1.474E-06	7.451E-05	3.8E-05	1.9E-03
EU3	Thorium-232	1.23	1.53	0.00	7.617E-01	9.684E+00	0.0	0.0	1.822E-04	2.509E-04	0.0E+00	0.0E+00
EU3	Uranium-234	81.70		81.70	7.568E-02	9.237E-02	6.2	7.5	7.923E-07	1.079E-06	6.5E-05	8.8E-05
EU3	Uranium-235	2.91	0.21	2.70	2.762E-01	5.330E-01	0.7	1.4	5.213E-06	5.261E-06	1.4E-05	1.4E-05
EU3	Uranium-238	21.00	2.88	18.12	1.081E-01	9.931E-02	2.0	1.8	1.915E-06	1.758E-06	3.5E-05	3.2E-05
						Total Dose =	**302.2**	**311.8**		**Total Risk =**	**4.3E-03**	**4.6E-03**

Unit	Analyte	Gross EPC (pCi/g)	BKG (pCi/g)	Net EPC (pCi/g)	DSR Year 0	DSR Year 1000	Dose (mrem/yr) Year 0	Dose (mrem/yr) Year 1000	RSR Year 0	RSR Year 1000	Risk (lifetime^{-1}) Year 0	Risk (lifetime^{-1}) Year 1000
EU4	Actinium-227	0.46	0.61	0.00	4.344E+00	6.123E-14	0.0	0.0	1.115E-05	1.571E-19	0.0E+00	0.0E+00
EU4	Protactinium-231	1.63	1.82	0.00	1.011E+01	1.344E+01	0.0	0.0	1.382E-05	2.322E-05	0.0E+00	0.0E+00
EU4	Lead-210	8.57		8.57	6.509E+00	1.602E-13	55.8	0.0	6.038E-05	1.486E-18	5.2E-04	1.3E-17
EU4	Radium-226	8.57	1.42	7.15	7.826E+00	9.183E+00	56.0	65.7	1.547E-04	1.376E-04	1.1E-03	9.8E-04
EU4	Radium-228	0.80	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-228	1.38	1.53	0.00	2.370E+00	0.000E+00	0.0	0.0	5.891E-06	0.000E+00	0.0E+00	0.0E+00
EU4	Thorium-230	11.30	2.56	8.74	7.642E-02	4.918E+00	0.7	43.0	1.474E-06	7.451E-05	1.3E-05	6.5E-04
EU4	Thorium-232	1.36	1.53	0.00	7.617E-01	9.684E+00	0.0	0.0	1.822E-04	2.509E-04	0.0E+00	0.0E+00
EU4	Uranium-234	5.21		5.21	7.568E-02	9.237E-02	0.4	0.5	7.923E-07	1.079E-06	4.1E-06	5.6E-06
EU4	Uranium-235	0.40	0.21	0.19	2.762E-01	5.330E-01	0.1	0.1	5.213E-06	5.261E-06	9.7E-07	9.8E-07
EU4	Uranium-238	2.94	2.88	0.06	1.081E-01	9.931E-02	0.0	0.0	1.915E-06	1.758E-06	1.1E-07	1.1E-07
						Total Dose =	**112.9**	**109.2**		**Total Risk =**	**1.6E-03**	**1.6E-03**

EPC = exposure point concentration = the lesser of the max and 95% upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

APPENDIX I

Painseville Dose and Risk Estimates by Exposure Unit

(0-10 ft)

Subsistence Farmer Dose and Risk Estimates

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU5	Actinium-227	0.73	0.61	0.12	4.344E+00	6.123E-14	0.5	0.0	1.115E-05	1.571E-19	1.4E-06	1.9E-20
EU5	Protactinium-231	1.95	1.82	0.13	1.011E+01	1.344E+01	1.3	1.7	1.382E-05	2.322E-05	1.8E-06	3.0E-06
EU5	Lead-210	5.50		5.50	6.509E+00	1.602E-13	35.8	0.0	6.038E-05	1.486E-18	3.3E-04	8.2E-18
EU5	Radium-226	5.50	1.42	4.08	7.826E+00	9.183E+00	31.9	37.5	1.547E-04	1.376E-04	6.3E-04	5.6E-04
EU5	Radium-228	1.10	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU5	Thorium-228	1.80	1.53	0.27	2.370E+00	0.000E+00	0.6	0.0	5.891E-06	0.000E+00	1.6E-06	0.0E+00
EU5	Thorium-230	10.30	2.56	7.74	7.642E-02	4.918E+00	0.6	38.1	1.474E-06	7.451E-05	1.1E-05	5.8E-04
EU5	Thorium-232	1.36	1.53	0.00	7.617E-01	9.684E+00	0.0	0.0	1.822E-04	2.509E-04	0.0E+00	0.0E+00
EU5	Uranium-234	3.71		3.71	7.568E-02	9.237E-02	0.3	0.3	7.923E-07	1.079E-06	2.9E-06	4.0E-06
EU5	Uranium-235	0.63	0.21	0.42	2.762E-01	5.330E-01	0.1	0.2	5.213E-06	5.261E-06	2.2E-06	2.2E-06
EU5	Uranium-238	4.61	2.88	1.73	1.081E-01	9.931E-02	0.2	0.2	1.915E-06	1.758E-06	3.3E-06	3.0E-06
						Total Dose =	**71.4**	**78.0**		**Total Risk =**	**9.9E-04**	**1.2E-03**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU6	Actinium-227	2.46	0.61	1.85	4.344E+00	6.123E-14	8.0	0.0	1.115E-05	1.571E-19	2.1E-05	2.9E-19
EU6	Protactinium-231	10.40	1.82	8.58	1.011E+01	1.344E+01	86.7	115.3	1.382E-05	2.322E-05	1.2E-04	2.0E-04
EU6	Lead-210	125.00		125.00	6.509E+00	1.602E-13	813.6	0.0	6.038E-05	1.486E-18	7.5E-03	1.9E-16
EU6	Radium-226	125.00	1.42	123.58	7.826E+00	9.183E+00	967.1	1134.8	1.547E-04	1.376E-04	1.9E-02	1.7E-02
EU6	Radium-228	1.18	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU6	Thorium-228	1.55	1.53	0.02	2.370E+00	0.000E+00	0.0	0.0	5.891E-06	0.000E+00	1.2E-07	0.0E+00
EU6	Thorium-230	102.00	2.56	99.44	7.642E-02	4.918E+00	7.6	489.0	1.474E-06	7.451E-05	1.5E-04	7.4E-03
EU6	Thorium-232	2.05	1.53	0.52	7.617E-01	9.684E+00	0.4	5.0	1.822E-04	2.509E-04	9.5E-05	1.3E-04
EU6	Uranium-234	43.90		43.90	7.568E-02	9.237E-02	3.3	4.1	7.923E-07	1.079E-06	3.5E-05	4.7E-05
EU6	Uranium-235	4.73	0.21	4.52	2.762E-01	5.330E-01	1.2	2.4	5.213E-06	5.261E-06	2.4E-05	2.4E-05
EU6	Uranium-238	19.90	2.88	17.02	1.081E-01	9.931E-02	1.8	1.7	1.915E-06	1.758E-06	3.3E-05	3.0E-05
						Total Dose =	**1890.0**	**1752.4**		**Total Risk =**	**2.7E-02**	**2.5E-02**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU7	Actinium-227	0.00	0.61	0.00	4.344E+00	6.123E-14	0.0	0.0	1.115E-05	1.571E-19	0.0E+00	0.0E+00
EU7	Protactinium-231	0.00	1.82	0.00	1.011E+01	1.344E+01	0.0	0.0	1.382E-05	2.322E-05	0.0E+00	0.0E+00
EU7	Lead-210	2.17		2.17	6.509E+00	1.602E-13	14.1	0.0	6.038E-05	1.486E-18	1.3E-04	3.2E-18
EU7	Radium-226	2.17	1.42	0.75	7.826E+00	9.183E+00	5.9	6.9	1.547E-04	1.376E-04	1.2E-04	1.0E-04
EU7	Radium-228	1.21	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-228	1.09	1.53	0.00	2.370E+00	0.000E+00	0.0	0.0	5.891E-06	0.000E+00	0.0E+00	0.0E+00
EU7	Thorium-230	1.78	2.56	0.00	7.642E-02	4.918E+00	0.0	0.0	1.474E-06	7.451E-05	0.0E+00	0.0E+00
EU7	Thorium-232	1.03	1.53	0.00	7.617E-01	9.684E+00	0.0	0.0	1.822E-04	2.509E-04	0.0E+00	0.0E+00
EU7	Uranium-234	1.78		1.78	7.568E-02	9.237E-02	0.1	0.2	7.923E-07	1.079E-06	1.4E-06	1.9E-06
EU7	Uranium-235	0.12	0.21	0.00	2.762E-01	5.330E-01	0.0	0.0	5.213E-06	5.261E-06	0.0E+00	0.0E+00
EU7	Uranium-238	1.81	2.88	0.00	1.081E-01	9.931E-02	0.0	0.0	1.915E-06	1.758E-06	0.0E+00	0.0E+00
						Total Dose =	**20.1**	**7.1**		**Total Risk =**	**2.5E-04**	**1.1E-04**

		Gross EPC	BKG	Net EPC	DSR		Dose (mrem/yr)		RSR		Risk (lifetime^{-1})	
Unit	Analyte	(pCi/g)	(pCi/g)	(pCi/g)	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000	Year 0	Year 1000
EU8	Actinium-227	0.63	0.61	0.02	4.344E+00	6.123E-14	0.1	0.0	1.115E-05	1.571E-19	2.7E-07	3.8E-21
EU8	Protactinium-231	1.92	1.82	0.10	1.011E+01	1.344E+01	1.0	1.3	1.382E-05	2.322E-05	1.4E-06	2.3E-06
EU8	Lead-210	15.20		15.20	6.509E+00	1.602E-13	98.9	0.0	6.038E-05	1.486E-18	9.2E-04	2.3E-17
EU8	Radium-226	15.20	1.42	13.78	7.826E+00	9.183E+00	107.8	126.5	1.547E-04	1.376E-04	2.1E-03	1.9E-03
EU8	Radium-228	1.07	1.41	0.00	6.785E+00	0.000E+00	0.0	0.0	6.895E-05	0.000E+00	0.0E+00	0.0E+00
EU8	Thorium-228	1.85	1.53	0.32	2.370E+00	0.000E+00	0.8	0.0	5.891E-06	0.000E+00	1.9E-06	0.0E+00
EU8	Thorium-230	14.70	2.56	12.14	7.642E-02	4.918E+00	0.9	59.7	1.474E-06	7.451E-05	1.8E-05	9.0E-04
EU8	Thorium-232	3.31	1.53	1.78	7.617E-01	9.684E+00	1.4	17.2	1.822E-04	2.509E-04	3.2E-04	4.5E-04
EU8	Uranium-234	9.64		9.64	7.568E-02	9.237E-02	0.7	0.9	7.923E-07	1.079E-06	7.6E-06	1.0E-05
EU8	Uranium-235	1.12	0.21	0.91	2.762E-01	5.330E-01	0.3	0.5	5.213E-06	5.261E-06	4.7E-06	4.8E-06
EU8	Uranium-238	6.15	2.88	3.27	1.081E-01	9.931E-02	0.4	0.3	1.915E-06	1.758E-06	6.3E-06	5.7E-06
						Total Dose =	**212.3**	**206.5**		**Total Risk =**	**3.4E-03**	**3.3E-03**

EPC = exposure point concentration = the lesser of the max and 95th upper confidence level
BKG = average background
Net EPC = Gross EPC - BKG
DSR = dose-to-source ratio in mrem/yr per pCi/g
RSR = risk-to-source ratio in risk per pCi/g

Appendix J.
RESRAD Output for Baseline Risk

Table of Contents
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Part III: Intake Quantities and Health Risk Factors
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Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)

Sf-3	Ra-228+D		2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D		8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230		2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232		2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234		1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D		1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D		2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):				
Sf-Rn	Rn-222		1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218		3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214		6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214		1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220		1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216		3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212		3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212		3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):				
Sf-Rn	Rn-222 Indoor		7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor		5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor		1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor		2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.035E-02	0.000E+00	0.000E+00	0.000E+00	2.804E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.804E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	6.555E-01	0.000E+00	0.000E+00	0.000E+00	1.775E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.775E+02
Ra-226	7.560E-01	0.000E+00	0.000E+00	0.000E+00	2.047E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.047E+02
Ra-228	1.066E-03	0.000E+00	0.000E+00	0.000E+00	2.887E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.887E-01
Th-228	1.370E-02	0.000E+00	0.000E+00	0.000E+00	3.711E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.711E+00
Th-230	4.957E-01	0.000E+00	0.000E+00	0.000E+00	1.342E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.342E+02
Th-232	1.553E-02	0.000E+00	0.000E+00	0.000E+00	4.206E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.206E+00
U-234	6.367E-01	0.000E+00	0.000E+00	0.000E+00	1.724E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.724E+02
U-235	1.995E-02	0.000E+00	0.000E+00	0.000E+00	5.402E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.402E+00
U-238	1.996E-01	0.000E+00	0.000E+00	0.000E+00	5.406E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.406E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.479E-06	0.0016	3.729E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.604E-08	0.0000
Pa-231	1.740E-10	0.0000	5.974E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.330E-11	0.0000
Pb-210	7.012E-07	0.0004	2.320E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.220E-05	0.0078
Ra-226	1.500E-03	0.9605	2.188E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.729E-06	0.0024
Ra-228	1.161E-05	0.0074	1.433E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.700E-07	0.0001
Th-228	1.981E-05	0.0127	3.890E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.959E-08	0.0000
Th-230	9.791E-08	0.0001	3.530E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.776E-07	0.0004
Th-232	1.282E-09	0.0000	1.681E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.428E-08	0.0000
U-234	3.875E-08	0.0000	1.804E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.771E-07	0.0004
U-235	2.579E-06	0.0017	5.008E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.189E-08	0.0000
U-238	5.305E-06	0.0034	4.639E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.822E-07	0.0002
Total	1.543E-03	0.9878	1.130E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.790E-05	0.0115

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.572E-06	0.0016
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.933E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.314E-05	0.0084
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.504E-03	0.9631
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.178E-05	0.0075
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.991E-05	0.0127
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.129E-06	0.0007
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.237E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.962E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.606E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.634E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.562E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.478E-06	0.0016	3.728E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.604E-08	0.0000
Pb-210	4.658E-07	0.0003	1.541E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.107E-06	0.0052
Ra-226	1.495E-03	0.9573	2.957E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.802E-06	0.0050
Ra-228	9.524E-07	0.0006	1.215E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.008E-09	0.0000
Th-228	2.756E-06	0.0018	5.411E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.290E-09	0.0000
Th-230	5.414E-06	0.0035	3.540E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.010E-07	0.0004
Th-232	2.771E-05	0.0177	5.051E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.386E-07	0.0002
U-234	3.928E-08	0.0000	1.804E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.772E-07	0.0004
U-235	2.579E-06	0.0017	5.020E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.191E-08	0.0000
U-238	5.305E-06	0.0034	4.639E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.822E-07	0.0002
Total	1.543E-03	0.9878	1.130E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.790E-05	0.0115

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.571E-06	0.0016
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.727E-06	0.0056
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.503E-03	0.9625
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.606E-07	0.0006
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.770E-06	0.0018
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.469E-06	0.0041
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.800E-05	0.0179
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.969E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.606E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.634E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.562E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.003E-02	0.000E+00	0.000E+00	0.000E+00	2.716E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.716E+00
Pa-231	4.219E-07	0.000E+00	0.000E+00	0.000E+00	1.143E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.143E-04
Pb-210	6.584E-01	0.000E+00	0.000E+00	0.000E+00	1.783E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.783E+02
Ra-226	7.559E-01	0.000E+00	0.000E+00	0.000E+00	2.047E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.047E+02
Ra-228	2.709E-03	0.000E+00	0.000E+00	0.000E+00	7.335E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.335E-01
Th-228	1.013E-02	0.000E+00	0.000E+00	0.000E+00	2.744E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.744E+00
Th-230	4.956E-01	0.000E+00	0.000E+00	0.000E+00	1.342E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.342E+02
Th-232	1.553E-02	0.000E+00	0.000E+00	0.000E+00	4.206E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.206E+00
U-234	6.364E-01	0.000E+00	0.000E+00	0.000E+00	1.723E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.723E+02
U-235	1.994E-02	0.000E+00	0.000E+00	0.000E+00	5.400E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.400E+00
U-238	1.995E-01	0.000E+00	0.000E+00	0.000E+00	5.404E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.404E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	2.401E-06	0.0015	3.612E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.429E-08	0.0000
Pa-231	1.879E-10	0.0000	6.451E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.436E-11	0.0000
Pb-210	7.032E-07	0.0005	2.327E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.224E-05	0.0078
Ra-226	1.500E-03	0.9601	2.188E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.728E-06	0.0024
Ra-228	1.215E-05	0.0078	1.501E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.780E-07	0.0001
Th-228	2.001E-05	0.0128	3.929E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.020E-08	0.0000
Th-230	9.790E-08	0.0001	3.530E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.776E-07	0.0004
Th-232	1.282E-09	0.0000	1.681E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.428E-08	0.0000
U-234	3.873E-08	0.0000	1.803E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.767E-07	0.0004
U-235	2.578E-06	0.0016	5.005E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.188E-08	0.0000
U-238	5.303E-06	0.0034	4.637E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.820E-07	0.0002
Total	1.543E-03	0.9878	1.130E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.794E-05	0.0115

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.491E-06	0.0016
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.087E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.318E-05	0.0084
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.504E-03	0.9626
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.233E-05	0.0079
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.011E-05	0.0129
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.129E-06	0.0007
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.237E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.958E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.604E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.631E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.562E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
   and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.400E-06	0.0015	3.611E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.428E-08	0.0000
Pb-210	4.514E-07	0.0003	1.494E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.857E-06	0.0050
Ra-226	1.494E-03	0.9566	3.010E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.085E-06	0.0052
Ra-228	9.053E-07	0.0006	1.197E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.396E-09	0.0000
Th-228	1.918E-06	0.0012	3.766E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.770E-09	0.0000
Th-230	5.838E-06	0.0037	3.540E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.033E-07	0.0005
Th-232	2.934E-05	0.0188	5.264E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.503E-07	0.0002
U-234	3.932E-08	0.0000	1.804E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.768E-07	0.0004
U-235	2.578E-06	0.0017	5.018E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.190E-08	0.0000
U-238	5.303E-06	0.0034	4.637E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.821E-07	0.0002
Total	1.543E-03	0.9878	1.130E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.794E-05	0.0115

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.491E-06	0.0016
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.458E-06	0.0054
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.503E-03	0.9619
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.129E-07	0.0006
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.928E-06	0.0012
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.895E-06	0.0044
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.965E-05	0.0190
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.965E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.605E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.631E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.562E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	9.410E-03	0.000E+00	0.000E+00	0.000E+00	2.548E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.548E+00
Pa-231	1.265E-06	0.000E+00	0.000E+00	0.000E+00	3.426E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.426E-04
Pb-210	6.639E-01	0.000E+00	0.000E+00	0.000E+00	1.798E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.798E+02
Ra-226	7.557E-01	0.000E+00	0.000E+00	0.000E+00	2.046E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.046E+02
Ra-228	5.456E-03	0.000E+00	0.000E+00	0.000E+00	1.477E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.477E+00
Th-228	7.126E-03	0.000E+00	0.000E+00	0.000E+00	1.930E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.930E+00
Th-230	4.956E-01	0.000E+00	0.000E+00	0.000E+00	1.342E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.342E+02
Th-232	1.553E-02	0.000E+00	0.000E+00	0.000E+00	4.206E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.206E+00
U-234	6.358E-01	0.000E+00	0.000E+00	0.000E+00	1.722E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.722E+02
U-235	1.992E-02	0.000E+00	0.000E+00	0.000E+00	5.395E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.395E+00
U-238	1.994E-01	0.000E+00	0.000E+00	0.000E+00	5.399E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.399E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

1RESRAD, Version 6.2   T« Limit = 0.5 year   06/30/2002 14:35 Page 13
Intrisk : Painesville EU 1 Industrial 2002   File: Pnveu1i2002.rad

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.253E-06	0.0014	3.389E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.093E-08	0.0000
Pa-231	2.156E-10	0.0000	7.403E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.648E-11	0.0000
Pb-210	7.070E-07	0.0005	2.339E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.231E-05	0.0079
Ra-226	1.499E-03	0.9590	2.187E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.727E-06	0.0024
Ra-228	1.307E-05	0.0084	1.614E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.914E-07	0.0001
Th-228	2.094E-05	0.0134	4.112E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.300E-08	0.0000
Th-230	9.790E-08	0.0001	3.530E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.776E-07	0.0004
Th-232	1.282E-09	0.0000	1.681E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.428E-08	0.0000
U-234	3.870E-08	0.0000	1.801E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.761E-07	0.0004
U-235	2.575E-06	0.0016	5.001E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.186E-08	0.0000
U-238	5.298E-06	0.0034	4.633E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.818E-07	0.0002
Total	1.544E-03	0.9878	1.131E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.802E-05	0.0115

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.337E-06	0.0015
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.395E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.325E-05	0.0085
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.503E-03	0.9615
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.326E-05	0.0085
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.105E-05	0.0135
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.128E-06	0.0007
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.237E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.949E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.602E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.626E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.564E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

1RESRAD, Version 6.2   T« Limit = 0.5 year   06/30/2002 14:35 Page 14
Intrisk : Painesville EU 1 Industrial 2002   File: Pnveu1i2002.rad

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.252E-06	0.0014	3.388E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.092E-08	0.0000
Pb-210	4.239E-07	0.0003	1.403E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.379E-06	0.0047
Ra-226	1.493E-03	0.9549	3.111E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.623E-06	0.0055
Ra-228	7.787E-07	0.0005	1.073E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.228E-09	0.0000
Th-228	9.293E-07	0.0006	1.825E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.796E-09	0.0000
Th-230	6.686E-06	0.0043	3.542E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.080E-07	0.0005
Th-232	3.231E-05	0.0207	5.664E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.707E-07	0.0002
U-234	3.943E-08	0.0000	1.802E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.762E-07	0.0004
U-235	2.576E-06	0.0016	5.016E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.188E-08	0.0000
U-238	5.298E-06	0.0034	4.633E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.818E-07	0.0002
Total	1.544E-03	0.9878	1.131E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.802E-05	0.0115

1RESRAD, Version 6.2   T« Limit = 0.5 year   06/30/2002 14:35 Page 15

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.337E-06	0.0015
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.943E-06	0.0051
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.502E-03	0.9607
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.850E-07	0.0005
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.339E-07	0.0006
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.748E-06	0.0050
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.263E-05	0.0209
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.959E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.603E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.626E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.564E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	7.527E-03	0.000E+00	0.000E+00	0.000E+00	2.038E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.038E+00
Pa-231	4.209E-06	0.000E+00	0.000E+00	0.000E+00	1.140E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.140E-03
Pb-210	6.805E-01	0.000E+00	0.000E+00	0.000E+00	1.843E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.843E+02
Ra-226	7.548E-01	0.000E+00	0.000E+00	0.000E+00	2.044E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.044E+02
Ra-228	1.120E-02	0.000E+00	0.000E+00	0.000E+00	3.032E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.032E+00
Th-228	9.566E-03	0.000E+00	0.000E+00	0.000E+00	2.591E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.591E+00
Th-230	4.955E-01	0.000E+00	0.000E+00	0.000E+00	1.342E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.342E+02
Th-232	1.553E-02	0.000E+00	0.000E+00	0.000E+00	4.205E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.205E+00
U-234	6.337E-01	0.000E+00	0.000E+00	0.000E+00	1.716E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.716E+02
U-235	1.986E-02	0.000E+00	0.000E+00	0.000E+00	5.377E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.377E+00
U-238	1.987E-01	0.000E+00	0.000E+00	0.000E+00	5.381E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.381E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0
Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.802E-06	0.0012	2.711E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.075E-08	0.0000
Pa-231	3.125E-10	0.0000	1.073E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.388E-11	0.0000
Pb-210	7.185E-07	0.0005	2.377E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.251E-05	0.0080
Ra-226	1.498E-03	0.9556	2.184E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.723E-06	0.0024
Ra-228	1.499E-05	0.0096	1.851E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.195E-07	0.0001
Th-228	2.464E-05	0.0157	4.838E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.413E-08	0.0000
Th-230	9.788E-08	0.0001	3.529E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.775E-07	0.0004
Th-232	1.281E-09	0.0000	1.680E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.428E-08	0.0000
U-234	3.857E-08	0.0000	1.795E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.739E-07	0.0004
U-235	2.567E-06	0.0016	4.984E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.178E-08	0.0000
U-238	5.280E-06	0.0034	4.618E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.809E-07	0.0002
Total	1.548E-03	0.9876	1.134E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.824E-05	0.0116

0
Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.870E-06	0.0012
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.471E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.346E-05	0.0086
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.502E-03	0.9582
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.521E-05	0.0097
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.476E-05	0.0158
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.128E-06	0.0007
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.236E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.920E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.594E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.608E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.567E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.801E-06	0.0011	2.710E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.073E-08	0.0000
Pb-210	3.403E-07	0.0002	1.126E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.924E-06	0.0038
Ra-226	1.488E-03	0.9498	3.417E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.026E-05	0.0065
Ra-228	3.729E-07	0.0002	5.359E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.362E-09	0.0000
Th-228	7.356E-08	0.0000	1.444E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.213E-10	0.0000
Th-230	9.648E-06	0.0062	3.547E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.266E-07	0.0005
Th-232	3.918E-05	0.0250	6.636E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.153E-07	0.0002
U-234	3.996E-08	0.0000	1.796E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.741E-07	0.0004
U-235	2.568E-06	0.0016	5.010E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.183E-08	0.0000
U-238	5.280E-06	0.0034	4.618E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.809E-07	0.0002
Total	1.548E-03	0.9876	1.134E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.824E-05	0.0116

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.869E-06	0.0012
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.377E-06	0.0041
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.499E-03	0.9566
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.758E-07	0.0002
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.392E-08	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.073E-05	0.0068
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.956E-05	0.0252
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.937E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.595E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.608E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.567E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Water Independent Pathways (Inhalation w/o radon) Water Dependent Pathways

Radio- Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	3.981E-03	0.000E+00	0.000E+00	0.000E+00	1.078E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.078E+00
Pa-231	1.256E-05	0.000E+00	0.000E+00	0.000E+00	3.401E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.401E-03
Pb-210	7.112E-01	0.000E+00	0.000E+00	0.000E+00	1.926E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.926E+02
Ra-226	7.523E-01	0.000E+00	0.000E+00	0.000E+00	2.037E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.037E+02
Ra-228	1.513E-02	0.000E+00	0.000E+00	0.000E+00	4.098E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.098E+00
Th-228	1.494E-02	0.000E+00	0.000E+00	0.000E+00	4.045E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.045E+00
Th-230	4.953E-01	0.000E+00	0.000E+00	0.000E+00	1.341E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.341E+02
Th-232	1.552E-02	0.000E+00	0.000E+00	0.000E+00	4.203E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.203E+00
U-234	6.278E-01	0.000E+00	0.000E+00	0.000E+00	1.700E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.700E+02
U-235	1.967E-02	0.000E+00	0.000E+00	0.000E+00	5.327E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.327E+00
U-238	1.969E-01	0.000E+00	0.000E+00	0.000E+00	5.331E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.331E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.545E-07	0.0006	1.436E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.158E-08	0.0000
Pa-231	5.873E-10	0.0000	2.016E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.488E-11	0.0000
Pb-210	7.395E-07	0.0005	2.447E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.287E-05	0.0082
Ra-226	1.493E-03	0.9530	2.177E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.710E-06	0.0024
Ra-228	1.629E-05	0.0104	2.013E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.386E-07	0.0002
Th-228	2.791E-05	0.0178	5.481E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.397E-08	0.0001
Th-230	9.783E-08	0.0001	3.528E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.771E-07	0.0004
Th-232	1.281E-09	0.0000	1.679E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.426E-08	0.0000
U-234	3.821E-08	0.0000	1.779E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.676E-07	0.0004
U-235	2.543E-06	0.0016	4.938E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.158E-08	0.0000
U-238	5.231E-06	0.0033	4.575E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.783E-07	0.0002
Total	1.546E-03	0.9874	1.132E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.860E-05	0.0119

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.904E-07	0.0006
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.523E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.386E-05	0.0088
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.497E-03	0.9556
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.654E-05	0.0106
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.805E-05	0.0179
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.128E-06	0.0007
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.234E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.837E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.569E-06	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.555E-06	0.0035
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.566E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.516E-07	0.0006	1.432E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.152E-08	0.0000
Pb-210	1.817E-07	0.0001	6.012E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.163E-06	0.0020
Ra-226	1.475E-03	0.9419	3.983E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.330E-05	0.0085
Ra-228	3.421E-08	0.0000	4.957E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.142E-10	0.0000
Th-228	5.240E-11	0.0000	1.029E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.576E-13	0.0000
Th-230	1.805E-05	0.0115	3.566E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.939E-07	0.0005
Th-232	4.418E-05	0.0282	7.356E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.467E-07	0.0002
U-234	4.278E-08	0.0000	1.780E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.679E-07	0.0004
U-235	2.546E-06	0.0016	5.001E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.169E-08	0.0000
U-238	5.231E-06	0.0033	4.575E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.783E-07	0.0002
Total	1.546E-03	0.9874	1.132E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.860E-05	0.0119

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.875E-07	0.0006
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.404E-06	0.0022
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.489E-03	0.9507
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.447E-08	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.266E-11	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.921E-05	0.0123
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.460E-05	0.0285
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.888E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.573E-06	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.555E-06	0.0035
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.566E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	4.550E-04	0.000E+00	0.000E+00	0.000E+00	1.232E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.232E-01
Pa-231	4.107E-05	0.000E+00	0.000E+00	0.000E+00	1.112E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.112E-02
Pb-210	7.363E-01	0.000E+00	0.000E+00	0.000E+00	1.994E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.994E+02
Ra-226	7.437E-01	0.000E+00	0.000E+00	0.000E+00	2.014E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.014E+02
Ra-228	1.549E-02	0.000E+00	0.000E+00	0.000E+00	4.195E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.195E+00
Th-228	1.549E-02	0.000E+00	0.000E+00	0.000E+00	4.195E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.195E+00
Th-230	4.944E-01	0.000E+00	0.000E+00	0.000E+00	1.339E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.339E+02
Th-232	1.549E-02	0.000E+00	0.000E+00	0.000E+00	4.194E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.194E+00
U-234	6.075E-01	0.000E+00	0.000E+00	0.000E+00	1.645E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.645E+02
U-235	1.904E-02	0.000E+00	0.000E+00	0.000E+00	5.156E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.156E+00
U-238	1.905E-01	0.000E+00	0.000E+00	0.000E+00	5.160E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.160E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.137E-07	0.0001	1.710E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.571E-09	0.0000
Pa-231	1.525E-09	0.0000	5.237E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.166E-10	0.0000
Pb-210	7.547E-07	0.0005	2.497E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.314E-05	0.0085
Ra-226	1.476E-03	0.9529	2.152E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.668E-06	0.0024
Ra-228	1.639E-05	0.0106	2.025E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.401E-07	0.0002
Th-228	2.819E-05	0.0182	5.536E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.481E-08	0.0001
Th-230	9.765E-08	0.0001	3.521E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.759E-07	0.0004
Th-232	1.278E-09	0.0000	1.676E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.421E-08	0.0000
U-234	3.698E-08	0.0000	1.721E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.461E-07	0.0004
U-235	2.461E-06	0.0016	4.779E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.089E-08	0.0000
U-238	5.063E-06	0.0033	4.428E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.693E-07	0.0002
Total	1.529E-03	0.9872	1.114E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.877E-05	0.0121

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.180E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.694E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.414E-05	0.0091
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.480E-03	0.9554
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.663E-05	0.0107
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.833E-05	0.0183
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-06	0.0007
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.225E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.552E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.487E-06	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.377E-06	0.0035
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.549E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.020E-07	0.0001	1.534E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.306E-09	0.0000
Pb-210	2.020E-08	0.0000	6.684E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.516E-07	0.0002
Ra-226	1.430E-03	0.9231	4.457E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.603E-05	0.0104
Ra-228	7.395E-12	0.0000	1.072E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.630E-14	0.0000
Th-228	5.056E-22	0.0000	9.928E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.521E-24	0.0000
Th-230	4.684E-05	0.0302	3.643E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-06	0.0007
Th-232	4.459E-05	0.0288	7.414E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.491E-07	0.0002
U-234	6.736E-08	0.0000	1.726E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.471E-07	0.0004
U-235	2.474E-06	0.0016	5.008E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.127E-08	0.0000
U-238	5.063E-06	0.0033	4.429E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.694E-07	0.0002
Total	1.529E-03	0.9872	1.114E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.877E-05	0.0121

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.058E-07	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.785E-07	0.0002
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.446E-03	0.9338
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.452E-12	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.082E-22	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.830E-05	0.0312
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.501E-05	0.0291
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.870E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.501E-06	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.377E-06	0.0035
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.549E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.058E-04	0.000E+00	0.000E+00	0.000E+00	2.865E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.865E-02
Pa-231	1.167E-04	0.000E+00	0.000E+00	0.000E+00	3.160E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.160E-02
Pb-210	7.171E-01	0.000E+00	0.000E+00	0.000E+00	1.942E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.942E+02
Ra-226	7.203E-01	0.000E+00	0.000E+00	0.000E+00	1.951E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.951E+02
Ra-228	1.540E-02	0.000E+00	0.000E+00	0.000E+00	4.171E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.171E+00
Th-228	1.540E-02	0.000E+00	0.000E+00	0.000E+00	4.171E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.171E+00
Th-230	4.917E-01	0.000E+00	0.000E+00	0.000E+00	1.332E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.332E+02
Th-232	1.540E-02	0.000E+00	0.000E+00	0.000E+00	4.171E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.171E+00
U-234	5.532E-01	0.000E+00	0.000E+00	0.000E+00	1.498E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.498E+02
U-235	1.734E-02	0.000E+00	0.000E+00	0.000E+00	4.696E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.696E+00
U-238	1.736E-01	0.000E+00	0.000E+00	0.000E+00	4.700E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.700E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.823E-08	0.0000	5.751E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.645E-10	0.0000
Pa-231	4.013E-09	0.0000	1.378E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.067E-10	0.0000
Pb-210	7.338E-07	0.0005	2.428E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.277E-05	0.0085
Ra-226	1.429E-03	0.9524	2.085E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.553E-06	0.0024
Ra-228	1.630E-05	0.0109	2.013E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.387E-07	0.0002
Th-228	2.803E-05	0.0187	5.504E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.433E-08	0.0001
Th-230	9.713E-08	0.0001	3.503E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.723E-07	0.0004
Th-232	1.271E-09	0.0000	1.667E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.408E-08	0.0000
U-234	3.367E-08	0.0000	1.567E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.883E-07	0.0004
U-235	2.242E-06	0.0015	4.353E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.903E-08	0.0000
U-238	4.612E-06	0.0031	4.033E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.453E-07	0.0002
Total	1.482E-03	0.9872	1.077E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.820E-05	0.0121

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.967E-08	0.0000

Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.458E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.375E-05	0.0092
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.433E-03	0.9550
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.654E-05	0.0110
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.817E-05	0.0188
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.120E-06	0.0007
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.202E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.787E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.265E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.898E-06	0.0033
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.501E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.728E-10	0.0000	2.599E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.907E-12	0.0000
Pb-210	3.800E-11	0.0000	1.257E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.614E-10	0.0000
Ra-226	1.306E-03	0.8703	4.143E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.502E-05	0.0100
Ra-228	2.494E-22	0.0000	3.613E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.561E-24	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.239E-04	0.0825	3.860E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.972E-06	0.0013
Th-232	4.434E-05	0.0295	7.372E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.471E-07	0.0002
U-234	2.524E-07	0.0002	1.579E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.925E-07	0.0004
U-235	2.284E-06	0.0015	5.064E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.019E-08	0.0000
U-238	4.612E-06	0.0031	4.038E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.455E-07	0.0002
Total	1.482E-03	0.9872	1.077E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.820E-05	0.0121

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.793E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.120E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.322E-03	0.8806
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.513E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.262E-04	0.0841
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.476E-05	0.0298
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.003E-06	0.0007
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.309E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.898E-06	0.0033
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.501E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	3.146E-04	0.000E+00	0.000E+00	0.000E+00	8.519E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.519E-02
Pa-231	3.228E-04	0.000E+00	0.000E+00	0.000E+00	8.743E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.743E-02
Pb-210	6.484E-01	0.000E+00	0.000E+00	0.000E+00	1.756E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.756E+02

Ra-226	6.518E-01	0.000E+00	0.000E+00	0.000E+00	1.765E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.765E+02
Ra-228	1.510E-02	0.000E+00	0.000E+00	0.000E+00	4.090E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.090E+00
Th-228	1.510E-02	0.000E+00	0.000E+00	0.000E+00	4.090E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.090E+00
Th-230	4.821E-01	0.000E+00	0.000E+00	0.000E+00	1.305E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.305E+02
Th-232	1.510E-02	0.000E+00	0.000E+00	0.000E+00	4.089E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.089E+00
U-234	3.985E-01	0.000E+00	0.000E+00	0.000E+00	1.079E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.079E+02
U-235	1.251E-02	0.000E+00	0.000E+00	0.000E+00	3.388E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.388E+00
U-238	1.252E-01	0.000E+00	0.000E+00	0.000E+00	3.390E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.390E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.103E-07	0.0001	1.659E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.494E-09	0.0000
Pa-231	1.079E-08	0.0000	3.706E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.250E-10	0.0000
Pb-210	6.637E-07	0.0005	2.196E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.155E-05	0.0085
Ra-226	1.294E-03	0.9510	1.887E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.216E-06	0.0024
Ra-228	1.598E-05	0.0117	1.974E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.341E-07	0.0002
Th-228	2.749E-05	0.0202	5.397E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.269E-08	0.0001
Th-230	9.521E-08	0.0001	3.433E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.590E-07	0.0005
Th-232	1.246E-09	0.0000	1.634E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.361E-08	0.0000
U-234	2.425E-08	0.0000	1.129E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.238E-07	0.0003
U-235	1.617E-06	0.0012	3.140E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-08	0.0000
U-238	3.327E-06	0.0024	2.909E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.770E-07	0.0001
Total	1.343E-03	0.9872	9.711E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.639E-05	0.0120

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.145E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.199E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.244E-05	0.0091
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.297E-03	0.9535
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.622E-05	0.0119
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.762E-05	0.0203
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.098E-06	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.119E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.609E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.634E-06	0.0012
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.533E-06	0.0026
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.361E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.457E-20	0.0000	5.201E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.817E-22	0.0000
Pb-210	1.097E-20	0.0000	3.629E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.909E-19	0.0000
Ra-226	9.525E-04	0.7001	3.021E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-05	0.0081
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	3.403E-04	0.2501	4.458E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.447E-06	0.0033
Th-232	4.347E-05	0.0319	7.228E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.403E-07	0.0003
U-234	1.867E-06	0.0014	1.166E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.497E-07	0.0003
U-235	1.738E-06	0.0013	5.170E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.704E-08	0.0000
U-238	3.327E-06	0.0024	2.920E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.773E-07	0.0001
Total	1.343E-03	0.9872	9.711E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.639E-05	0.0120

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.587E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.055E-19	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.638E-04	0.7083
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.452E-04	0.2537
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.388E-05	0.0323
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.433E-06	0.0018
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.760E-06	0.0013
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.534E-06	0.0026
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.361E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents
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Part III: Intake Quantities and Health Risk Factors
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Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

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Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.979E-03	0.000E+00	0.000E+00	0.000E+00	2.234E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.234E-02
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	8.298E-03	0.000E+00	0.000E+00	0.000E+00	3.723E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.723E-02
Ra-226	9.421E-02	0.000E+00	0.000E+00	0.000E+00	4.227E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.227E-01
Th-230	8.806E-02	0.000E+00	0.000E+00	0.000E+00	3.951E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.951E-01
U-234	6.873E-02	0.000E+00	0.000E+00	0.000E+00	3.084E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.084E-01
U-235	7.810E-03	0.000E+00	0.000E+00	0.000E+00	3.504E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.504E-02
U-238	3.515E-02	0.000E+00	0.000E+00	0.000E+00	1.577E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.577E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.235E-07	0.0065	1.793E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.464E-10	0.0000
Pa-231	5.303E-11	0.0000	2.346E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.652E-14	0.0000
Pb-210	2.897E-08	0.0002	1.167E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.017E-08	0.0001
Ra-226	1.397E-04	0.9814	2.730E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.709E-09	0.0001
Th-230	1.397E-08	0.0001	6.272E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.994E-09	0.0000
U-234	3.461E-09	0.0000	1.947E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.211E-09	0.0000
U-235	7.927E-07	0.0056	1.970E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.426E-10	0.0000
U-238	7.128E-07	0.0050	8.205E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.268E-10	0.0000
Total	1.421E-04	0.9988	1.493E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.250E-08	0.0002

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.419E-07	0.0066
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.546E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.081E-08	0.0004
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.397E-04	0.9816
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.868E-08	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.415E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.948E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.219E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.423E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.234E-07	0.0065	1.793E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.464E-10	0.0000
Pb-210	4.845E-09	0.0000	1.951E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.700E-09	0.0000
Ra-226	1.390E-04	0.9766	3.685E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.611E-08	0.0001
Th-230	7.185E-07	0.0050	6.289E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.063E-09	0.0000
U-234	3.503E-09	0.0000	1.948E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.211E-09	0.0000
U-235	7.929E-07	0.0056	1.974E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.428E-10	0.0000
U-238	7.128E-07	0.0050	8.205E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.268E-10	0.0000
Total	1.421E-04	0.9988	1.493E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.250E-08	0.0002

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.418E-07	0.0066
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.497E-09	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.390E-04	0.9770
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.834E-07	0.0055
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.950E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.219E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.423E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	4.823E-03	0.000E+00	0.000E+00	0.000E+00	2.164E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.164E-02
Pa-231	1.652E-07	0.000E+00	0.000E+00	0.000E+00	7.413E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.413E-07
Pb-210	1.092E-02	0.000E+00	0.000E+00	0.000E+00	4.901E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.901E-02
Ra-226	9.421E-02	0.000E+00	0.000E+00	0.000E+00	4.227E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.227E-01
Th-230	8.806E-02	0.000E+00	0.000E+00	0.000E+00	3.951E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.951E-01
U-234	6.870E-02	0.000E+00	0.000E+00	0.000E+00	3.082E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.082E-01
U-235	7.809E-03	0.000E+00	0.000E+00	0.000E+00	3.504E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.504E-02
U-238	3.514E-02	0.000E+00	0.000E+00	0.000E+00	1.577E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.577E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	8.945E-07	0.0063	1.737E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.324E-10	0.0000
Pa-231	5.726E-11	0.0000	2.534E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.343E-14	0.0000
Pb-210	3.051E-08	0.0002	1.228E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.070E-08	0.0001
Ra-226	1.396E-04	0.9816	2.730E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.709E-09	0.0001
Th-230	1.397E-08	0.0001	6.272E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.994E-09	0.0000
U-234	3.459E-09	0.0000	1.946E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.210E-09	0.0000
U-235	7.927E-07	0.0056	1.969E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.426E-10	0.0000
U-238	7.128E-07	0.0050	8.204E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.267E-10	0.0000
Total	1.421E-04	0.9988	1.493E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.302E-08	0.0002

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.123E-07	0.0064
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.989E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.349E-08	0.0004
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.397E-04	0.9818
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.868E-08	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.413E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.948E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.218E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.423E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	8.944E-07	0.0063	1.736E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.324E-10	0.0000
Pb-210	4.696E-09	0.0000	1.891E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.648E-09	0.0000
Ra-226	1.389E-04	0.9764	3.751E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.669E-08	0.0001
Th-230	7.747E-07	0.0054	6.290E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.070E-09	0.0000
U-234	3.506E-09	0.0000	1.947E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.210E-09	0.0000
U-235	7.928E-07	0.0056	1.975E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.428E-10	0.0000
U-238	7.128E-07	0.0050	8.204E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.267E-10	0.0000
Total	1.421E-04	0.9988	1.493E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.302E-08	0.0002

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.122E-07	0.0064
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.234E-09	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.390E-04	0.9768
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.397E-07	0.0059
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.950E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.218E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.423E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					
Radio- Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	4.525E-03	0.000E+00	0.000E+00	0.000E+00	2.030E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.030E-02
Pa-231	4.956E-07	0.000E+00	0.000E+00	0.000E+00	2.224E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.224E-06
Pb-210	1.594E-02	0.000E+00	0.000E+00	0.000E+00	7.150E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.150E-02
Ra-226	9.420E-02	0.000E+00	0.000E+00	0.000E+00	4.226E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.226E-01
Th-230	8.805E-02	0.000E+00	0.000E+00	0.000E+00	3.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.950E-01
U-234	6.863E-02	0.000E+00	0.000E+00	0.000E+00	3.079E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.079E-01
U-235	7.808E-03	0.000E+00	0.000E+00	0.000E+00	3.503E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.503E-02
U-238	3.513E-02	0.000E+00	0.000E+00	0.000E+00	1.576E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.576E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	8.393E-07	0.0059	1.629E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.057E-10	0.0000
Pa-231	6.574E-11	0.0000	2.909E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.073E-13	0.0000
Pb-210	3.343E-08	0.0002	1.346E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.173E-08	0.0001
Ra-226	1.396E-04	0.9819	2.730E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.708E-09	0.0001
Th-230	1.397E-08	0.0001	6.271E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.994E-09	0.0000
U-234	3.456E-09	0.0000	1.945E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.209E-09	0.0000
U-235	7.925E-07	0.0056	1.969E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.426E-10	0.0000
U-238	7.126E-07	0.0050	8.202E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.265E-10	0.0000

Total	1.420E-04	0.9988	1.494E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.402E-08	0.0002

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.560E-07	0.0060
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.876E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.862E-08	0.0004
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.397E-04	0.9822
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.867E-08	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.411E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.946E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.216E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.422E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	8.391E-07	0.0059	1.629E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.056E-10	0.0000
Pb-210	4.410E-09	0.0000	1.776E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.547E-09	0.0000
Ra-226	1.388E-04	0.9760	3.877E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.780E-08	0.0001
Th-230	8.871E-07	0.0062	6.292E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.084E-09	0.0000
U-234	3.515E-09	0.0000	1.945E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.209E-09	0.0000
U-235	7.927E-07	0.0056	1.975E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.428E-10	0.0000
U-238	7.126E-07	0.0050	8.203E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.265E-10	0.0000
Total	1.420E-04	0.9988	1.494E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.402E-08	0.0002

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.558E-07	0.0060
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.733E-09	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.388E-04	0.9764
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.521E-07	0.0067
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.418E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.948E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.216E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.422E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*

Ac-227	3.619E-03	0.000E+00	0.000E+00	0.000E+00	1.624E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.624E-02
Pa-231	1.651E-06	0.000E+00	0.000E+00	0.000E+00	7.407E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.407E-06
Pb-210	3.119E-02	0.000E+00	0.000E+00	0.000E+00	1.399E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.399E-01
Ra-226	9.417E-02	0.000E+00	0.000E+00	0.000E+00	4.225E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.225E-01
Th-230	8.803E-02	0.000E+00	0.000E+00	0.000E+00	3.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.950E-01
U-234	6.841E-02	0.000E+00	0.000E+00	0.000E+00	3.069E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.069E-01
U-235	7.802E-03	0.000E+00	0.000E+00	0.000E+00	3.500E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.500E-02
U-238	3.511E-02	0.000E+00	0.000E+00	0.000E+00	1.575E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.575E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.715E-07	0.0047	1.304E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.246E-10	0.0000
Pa-231	9.538E-11	0.0000	4.220E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.556E-13	0.0000
Pb-210	4.233E-08	0.0003	1.704E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.485E-08	0.0001
Ra-226	1.396E-04	0.9830	2.729E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.706E-09	0.0001
Th-230	1.396E-08	0.0001	6.270E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.994E-09	0.0000
U-234	3.444E-09	0.0000	1.938E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.205E-09	0.0000
U-235	7.919E-07	0.0056	1.968E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.425E-10	0.0000
U-238	7.121E-07	0.0050	8.196E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.259E-10	0.0000
Total	1.418E-04	0.9988	1.496E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.705E-08	0.0002

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.848E-07	0.0048
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.975E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.423E-08	0.0005
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.396E-04	0.9833
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.866E-08	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.403E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.940E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.211E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.420E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.

Ac-227	6.712E-07	0.0047	1.303E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.245E-10	0.0000
Pb-210	3.540E-09	0.0000	1.425E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.242E-09	0.0000
Ra-226	1.384E-04	0.9744	4.258E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.117E-08	0.0001
Th-230	1.280E-06	0.0090	6.302E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.139E-09	0.0000
U-234	3.556E-09	0.0000	1.939E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.206E-09	0.0000
U-235	7.923E-07	0.0056	1.978E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.428E-10	0.0000
U-238	7.121E-07	0.0050	8.197E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.260E-10	0.0000
Total	1.418E-04	0.9988	1.496E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.705E-08	0.0002

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.845E-07	0.0048
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.208E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.384E-04	0.9748
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.345E-06	0.0095
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.415E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.944E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.211E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.420E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.914E-03	0.000E+00	0.000E+00	0.000E+00	8.586E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.586E-03
Pa-231	4.944E-06	0.000E+00	0.000E+00	0.000E+00	2.218E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.218E-05
Pb-210	6.011E-02	0.000E+00	0.000E+00	0.000E+00	2.697E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.697E-01
Ra-226	9.408E-02	0.000E+00	0.000E+00	0.000E+00	4.221E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.221E-01
Th-230	8.798E-02	0.000E+00	0.000E+00	0.000E+00	3.947E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.947E-01
U-234	6.777E-02	0.000E+00	0.000E+00	0.000E+00	3.041E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.041E-01
U-235	7.786E-03	0.000E+00	0.000E+00	0.000E+00	3.493E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.493E-02
U-238	3.504E-02	0.000E+00	0.000E+00	0.000E+00	1.572E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.572E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.554E-07	0.0025	6.900E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.718E-10	0.0000
Pa-231	1.798E-10	0.0000	7.957E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.934E-13	0.0000
Pb-210	5.919E-08	0.0004	2.383E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.077E-08	0.0001
Ra-226	1.395E-04	0.9851	2.727E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.699E-09	0.0001
Th-230	1.396E-08	0.0001	6.266E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.993E-09	0.0000
U-234	3.412E-09	0.0000	1.920E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.194E-09	0.0000
U-235	7.903E-07	0.0056	1.964E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.422E-10	0.0000
U-238	7.107E-07	0.0050	8.180E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.242E-10	0.0000
Total	1.414E-04	0.9987	1.500E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.279E-08	0.0002

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.625E-07	0.0026
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.881E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.038E-07	0.0007
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.395E-04	0.9853
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.861E-08	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.381E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.924E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.197E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.416E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.546E-07	0.0025	6.884E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.714E-10	0.0000
Pb-210	1.890E-09	0.0000	7.610E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.632E-10	0.0000
Ra-226	1.371E-04	0.9686	4.963E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.746E-08	0.0002
Th-230	2.394E-06	0.0169	6.335E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.337E-09	0.0000
U-234	3.780E-09	0.0000	1.922E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.195E-09	0.0000
U-235	7.913E-07	0.0056	1.988E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.429E-10	0.0000
U-238	7.107E-07	0.0050	8.181E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.243E-10	0.0000
Total	1.414E-04	0.9987	1.500E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.279E-08	0.0002

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.616E-07	0.0026
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.314E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-04	0.9692
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.460E-06	0.0174
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.935E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.197E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.416E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	2.164E-04	0.000E+00	0.000E+00	0.000E+00	9.708E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.708E-04
Pa-231	1.637E-05	0.000E+00	0.000E+00	0.000E+00	7.346E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.346E-05
Pb-210	8.933E-02	0.000E+00	0.000E+00	0.000E+00	4.008E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.008E-01
Ra-226	9.378E-02	0.000E+00	0.000E+00	0.000E+00	4.207E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.207E-01
Th-230	8.779E-02	0.000E+00	0.000E+00	0.000E+00	3.939E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.939E-01
U-234	6.559E-02	0.000E+00	0.000E+00	0.000E+00	2.943E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.943E-01
U-235	7.731E-03	0.000E+00	0.000E+00	0.000E+00	3.468E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.468E-02
U-238	3.479E-02	0.000E+00	0.000E+00	0.000E+00	1.561E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.561E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.162E-08	0.0003	8.079E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.012E-11	0.0000
Pa-231	4.730E-10	0.0000	2.093E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.718E-13	0.0000
Pb-210	7.618E-08	0.0005	3.067E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.673E-08	0.0002
Ra-226	1.390E-04	0.9871	2.718E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.674E-09	0.0001
Th-230	1.393E-08	0.0001	6.253E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.988E-09	0.0000
U-234	3.302E-09	0.0000	1.858E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.156E-09	0.0000
U-235	7.847E-07	0.0056	1.950E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.412E-10	0.0000
U-238	7.056E-07	0.0050	8.121E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.184E-10	0.0000
Total	1.406E-04	0.9987	1.499E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.853E-08	0.0003

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.244E-08	0.0003
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.947E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.336E-07	0.0009
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.390E-04	0.9874
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.844E-08	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.304E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.868E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.145E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.800E-08	0.0003	7.378E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.837E-11	0.0000
Pb-210	2.101E-10	0.0000	8.461E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.374E-11	0.0000
Ra-226	1.329E-04	0.9436	5.553E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.310E-08	0.0002
Th-230	6.209E-06	0.0441	6.471E-08	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.220E-09	0.0000
U-234	5.750E-09	0.0000	1.863E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.157E-09	0.0000
U-235	7.888E-07	0.0056	2.041E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.437E-10	0.0000
U-238	7.056E-07	0.0050	8.125E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.186E-10	0.0000

Total	1.406E-04	0.9987	1.499E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.853E-08	0.0003

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.876E-08	0.0003
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.685E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.330E-04	0.9443
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.277E-06	0.0446
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.554E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.909E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.145E-07	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.355E-05	0.000E+00	0.000E+00	0.000E+00	1.954E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.954E-04
Pa-231	4.823E-05	0.000E+00	0.000E+00	0.000E+00	2.164E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.164E-04
Pb-210	9.218E-02	0.000E+00	0.000E+00	0.000E+00	4.136E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.136E-01
Ra-226	9.294E-02	0.000E+00	0.000E+00	0.000E+00	4.170E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.170E-01
Th-230	8.725E-02	0.000E+00	0.000E+00	0.000E+00	3.915E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.915E-01
U-234	5.973E-02	0.000E+00	0.000E+00	0.000E+00	2.680E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.680E-01
U-235	7.574E-03	0.000E+00	0.000E+00	0.000E+00	3.398E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.398E-02
U-238	3.409E-02	0.000E+00	0.000E+00	0.000E+00	1.529E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.529E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.222E-08	0.0001	2.372E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.907E-12	0.0000
Pa-231	1.290E-09	0.0000	5.708E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.105E-12	0.0000
Pb-210	7.763E-08	0.0006	3.126E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.724E-08	0.0002
Ra-226	1.378E-04	0.9874	2.694E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.605E-09	0.0001
Th-230	1.384E-08	0.0001	6.214E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.976E-09	0.0000
U-234	3.007E-09	0.0000	1.692E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.052E-09	0.0000
U-235	7.688E-07	0.0055	1.910E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.383E-10	0.0000
U-238	6.913E-07	0.0050	7.957E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.018E-10	0.0000
Total	1.393E-04	0.9987	1.474E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.882E-08	0.0003

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.246E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.349E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.361E-07	0.0010
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.378E-04	0.9877

Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.796E-08	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.098E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.709E-07	0.0055
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.001E-07	0.0050
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.395E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.438E-11	0.0000	1.250E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.112E-14	0.0000
Pb-210	3.953E-13	0.0000	1.592E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.387E-13	0.0000
Ra-226	1.214E-04	0.8703	5.162E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.101E-08	0.0002
Th-230	1.642E-05	0.1177	6.858E-08	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.804E-09	0.0000
U-234	2.063E-08	0.0001	1.705E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.060E-09	0.0000
U-235	7.823E-07	0.0056	2.203E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.463E-10	0.0000
U-238	6.913E-07	0.0050	7.965E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.023E-10	0.0000
Total	1.393E-04	0.9987	1.474E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.882E-08	0.0003

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.566E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.931E-13	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.215E-04	0.8709
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.649E-05	0.1182
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.874E-08	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.846E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.001E-07	0.0050
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.395E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.461E-04	0.000E+00	0.000E+00	0.000E+00	6.555E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.555E-04
Pa-231	1.507E-04	0.000E+00	0.000E+00	0.000E+00	6.763E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.763E-04
Pb-210	8.946E-02	0.000E+00	0.000E+00	0.000E+00	4.014E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.014E-01
Ra-226	9.020E-02	0.000E+00	0.000E+00	0.000E+00	4.047E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.047E-01
Th-230	8.533E-02	0.000E+00	0.000E+00	0.000E+00	3.828E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.828E-01
U-234	4.305E-02	0.000E+00	0.000E+00	0.000E+00	1.932E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.932E-01
U-235	7.052E-03	0.000E+00	0.000E+00	0.000E+00	3.164E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.164E-02
U-238	3.173E-02	0.000E+00	0.000E+00	0.000E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.424E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	3.979E-08	0.0003	7.724E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.923E-11	0.0000
Pa-231	3.920E-09	0.0000	1.734E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.395E-12	0.0000
Pb-210	7.534E-08	0.0006	3.033E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.644E-08	0.0002
Ra-226	1.337E-04	0.9877	2.614E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.381E-09	0.0001
Th-230	1.354E-08	0.0001	6.077E-08	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.933E-09	0.0000
U-234	2.168E-09	0.0000	1.220E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.585E-10	0.0000
U-235	7.158E-07	0.0053	1.778E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.288E-10	0.0000
U-238	6.436E-07	0.0048	7.408E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.465E-10	0.0000
Total	1.352E-04	0.9987	1.396E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.741E-08	0.0003

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.058E-08	0.0003
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.099E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.321E-07	0.0010
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.337E-04	0.9879
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.624E-08	0.0006
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.512E-08	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.177E-07	0.0053
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.518E-07	0.0048
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.288E-20	0.0000	2.501E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.227E-24	0.0000
Pb-210	1.141E-22	0.0000	4.594E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.003E-23	0.0000
Ra-226	8.854E-05	0.6540	3.764E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.261E-08	0.0002
Th-230	4.511E-05	0.3332	7.920E-08	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-08	0.0001
U-234	1.506E-07	0.0011	1.259E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.042E-10	0.0000
U-235	7.595E-07	0.0056	2.724E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.544E-10	0.0000
U-238	6.437E-07	0.0048	7.430E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.479E-10	0.0000
Total	1.352E-04	0.9987	1.396E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.741E-08	0.0003

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.314E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.001E-22	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.860E-05	0.6545
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.520E-05	0.3339
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.640E-07	0.0012
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.624E-07	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.519E-07	0.0048
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)

Sf-Rn ³ Radon K factors, (mrem/WLM): ³ ³ ³
Sf-Rn ³ Rn-222 Indoor ³ 7.60E+02 ³ 7.60E+02 ³ KFACTR(1,1)
Sf-Rn ³ Rn-222 Outdoor ³ 5.70E+02 ³ 5.70E+02 ³ KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.435E-02	0.000E+00	0.000E+00	0.000E+00	1.323E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.323E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	5.169E-01	0.000E+00	0.000E+00	0.000E+00	4.767E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.767E+01
Ra-226	3.573E-01	0.000E+00	0.000E+00	0.000E+00	3.296E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.296E+01
Th-230	5.303E-01	0.000E+00	0.000E+00	0.000E+00	4.891E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.891E+01
U-234	4.863E+00	0.000E+00	0.000E+00	0.000E+00	4.485E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.485E+02
U-235	4.344E-02	0.000E+00	0.000E+00	0.000E+00	4.007E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.007E+00
U-238	3.716E-01	0.000E+00	0.000E+00	0.000E+00	3.427E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.427E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.740E-06	0.0047	5.167E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.645E-08	0.0000
Pa-231	4.132E-10	0.0000	1.301E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.863E-12	0.0000
Pb-210	5.204E-07	0.0007	1.585E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.839E-06	0.0036
Ra-226	7.695E-04	0.9632	1.039E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.029E-07	0.0008
Th-230	1.149E-07	0.0001	3.781E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.471E-07	0.0003
U-234	3.248E-07	0.0004	1.378E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.761E-06	0.0022
U-235	6.135E-06	0.0077	1.091E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.623E-08	0.0000
U-238	1.069E-05	0.0134	8.635E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.789E-07	0.0002
Total	7.910E-04	0.9902	2.167E-06	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.672E-06	0.0071

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.818E-06	0.0048
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.361E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.518E-06	0.0044
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.702E-04	0.9641
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.401E-07	0.0009
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.464E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.163E-06	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-05	0.0137
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.989E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.739E-06	0.0047	5.166E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.644E-08	0.0000
Pb-210	3.991E-07	0.0005	1.215E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.177E-06	0.0027
Ra-226	7.635E-04	0.9557	1.398E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.256E-06	0.0016
Th-230	6.260E-06	0.0078	3.787E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.554E-07	0.0003
U-234	3.291E-07	0.0004	1.378E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.762E-06	0.0022
U-235	6.137E-06	0.0077	1.093E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.625E-08	0.0000
U-238	1.069E-05	0.0134	8.635E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.789E-07	0.0002
Total	7.910E-04	0.9902	2.167E-06	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.672E-06	0.0071

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.817E-06	0.0048
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.698E-06	0.0034
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.649E-04	0.9574
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.894E-06	0.0086
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.469E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.164E-06	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-05	0.0137
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.989E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.390E-02	0.000E+00	0.000E+00	0.000E+00	1.282E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.282E+00
Pa-231	9.190E-07	0.000E+00	0.000E+00	0.000E+00	8.475E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.475E-05
Pb-210	5.119E-01	0.000E+00	0.000E+00	0.000E+00	4.721E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.721E+01
Ra-226	3.574E-01	0.000E+00	0.000E+00	0.000E+00	3.296E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.296E+01
Th-230	5.303E-01	0.000E+00	0.000E+00	0.000E+00	4.891E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.891E+01
U-234	4.861E+00	0.000E+00	0.000E+00	0.000E+00	4.483E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.483E+02
U-235	4.342E-02	0.000E+00	0.000E+00	0.000E+00	4.005E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.005E+00
U-238	3.714E-01	0.000E+00	0.000E+00	0.000E+00	3.425E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.425E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	3.623E-06	0.0045	5.005E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.562E-08	0.0000
Pa-231	4.462E-10	0.0000	1.405E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.065E-11	0.0000
Pb-210	5.165E-07	0.0006	1.573E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.818E-06	0.0035
Ra-226	7.697E-04	0.9634	1.039E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.030E-07	0.0008
Th-230	1.149E-07	0.0001	3.781E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.471E-07	0.0003
U-234	3.246E-07	0.0004	1.377E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.761E-06	0.0022
U-235	6.133E-06	0.0077	1.090E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.622E-08	0.0000
U-238	1.068E-05	0.0134	8.631E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.788E-07	0.0002
Total	7.911E-04	0.9902	2.164E-06	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.649E-06	0.0071

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.699E-06	0.0046
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.709E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.491E-06	0.0044
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.704E-04	0.9643
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.402E-07	0.0009
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.462E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.160E-06	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-05	0.0137
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.989E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.622E-06	0.0045	5.003E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.561E-08	0.0000
Pb-210	3.868E-07	0.0005	1.178E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.110E-06	0.0026
Ra-226	7.632E-04	0.9553	1.423E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.301E-06	0.0016
Th-230	6.750E-06	0.0084	3.788E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.562E-07	0.0003
U-234	3.295E-07	0.0004	1.378E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.761E-06	0.0022
U-235	6.134E-06	0.0077	1.093E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.624E-08	0.0000
U-238	1.068E-05	0.0134	8.631E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.788E-07	0.0002
Total	7.911E-04	0.9902	2.164E-06	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.649E-06	0.0071

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.698E-06	0.0046
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.614E-06	0.0033
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.646E-04	0.9571
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.385E-06	0.0092
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.468E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.161E-06	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-05	0.0137
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.989E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.304E-02	0.000E+00	0.000E+00	0.000E+00	1.202E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.202E+00
Pa-231	2.755E-06	0.000E+00	0.000E+00	0.000E+00	2.541E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.541E-04
Pb-210	5.023E-01	0.000E+00	0.000E+00	0.000E+00	4.632E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.632E+01
Ra-226	3.575E-01	0.000E+00	0.000E+00	0.000E+00	3.297E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.297E+01
Th-230	5.304E-01	0.000E+00	0.000E+00	0.000E+00	4.891E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.891E+01
U-234	4.857E+00	0.000E+00	0.000E+00	0.000E+00	4.479E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.479E+02
U-235	4.338E-02	0.000E+00	0.000E+00	0.000E+00	4.001E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.001E+00
U-238	3.710E-01	0.000E+00	0.000E+00	0.000E+00	3.422E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.422E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.399E-06	0.0043	4.696E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.404E-08	0.0000
Pa-231	5.121E-10	0.0000	1.612E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.222E-11	0.0000
Pb-210	5.092E-07	0.0006	1.550E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.777E-06	0.0035
Ra-226	7.700E-04	0.9638	1.039E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.032E-07	0.0008
Th-230	1.150E-07	0.0001	3.781E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.472E-07	0.0003
U-234	3.243E-07	0.0004	1.376E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.759E-06	0.0022
U-235	6.127E-06	0.0077	1.089E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.621E-08	0.0000
U-238	1.067E-05	0.0134	8.623E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.786E-07	0.0002

Total	7.911E-04	0.9903	2.157E-06	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.606E-06	0.0070

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.470E-06	0.0043
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.405E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.442E-06	0.0043
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.707E-04	0.9647
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.402E-07	0.0009
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.459E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.154E-06	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-05	0.0137
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.989E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.398E-06	0.0043	4.694E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.403E-08	0.0000
Pb-210	3.633E-07	0.0005	1.106E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.982E-06	0.0025
Ra-226	7.625E-04	0.9545	1.470E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.388E-06	0.0017
Th-230	7.731E-06	0.0097	3.789E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.580E-07	0.0003
U-234	3.304E-07	0.0004	1.377E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.759E-06	0.0022
U-235	6.129E-06	0.0077	1.092E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.623E-08	0.0000
U-238	1.067E-05	0.0134	8.623E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.786E-07	0.0002
Total	7.911E-04	0.9903	2.157E-06	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.606E-06	0.0070

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.469E-06	0.0043
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.455E-06	0.0031
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.640E-04	0.9564
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.368E-06	0.0105
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.466E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.156E-06	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-05	0.0137
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.989E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*

Ac-227	1.043E-02	0.000E+00	0.000E+00	0.000E+00	9.619E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.619E-01
Pa-231	9.167E-06	0.000E+00	0.000E+00	0.000E+00	8.454E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.454E-04
Pb-210	4.731E-01	0.000E+00	0.000E+00	0.000E+00	4.363E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.363E+01
Ra-226	3.580E-01	0.000E+00	0.000E+00	0.000E+00	3.302E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.302E+01
Th-230	5.306E-01	0.000E+00	0.000E+00	0.000E+00	4.893E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.893E+01
U-234	4.841E+00	0.000E+00	0.000E+00	0.000E+00	4.464E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.464E+02
U-235	4.324E-02	0.000E+00	0.000E+00	0.000E+00	3.988E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.988E+00
U-238	3.698E-01	0.000E+00	0.000E+00	0.000E+00	3.411E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.411E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.720E-06	0.0034	3.758E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.924E-08	0.0000
Pa-231	7.422E-10	0.0000	2.337E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.771E-11	0.0000
Pb-210	4.868E-07	0.0006	1.482E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.655E-06	0.0033
Ra-226	7.710E-04	0.9650	1.041E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.040E-07	0.0008
Th-230	1.150E-07	0.0001	3.782E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.472E-07	0.0003
U-234	3.233E-07	0.0004	1.372E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.753E-06	0.0022
U-235	6.107E-06	0.0076	1.086E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.616E-08	0.0000
U-238	1.064E-05	0.0133	8.594E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.780E-07	0.0002
Total	7.914E-04	0.9905	2.136E-06	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.473E-06	0.0069

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.777E-06	0.0035
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.833E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.291E-06	0.0041
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.717E-04	0.9658
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.405E-07	0.0009
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.448E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.134E-06	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.090E-05	0.0136
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.990E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.

Ac-227	2.718E-06	0.0034	3.755E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.922E-08	0.0000
Pb-210	2.916E-07	0.0004	8.879E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.591E-06	0.0020
Ra-226	7.601E-04	0.9514	1.615E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.651E-06	0.0021
Th-230	1.115E-05	0.0140	3.795E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.647E-07	0.0003
U-234	3.347E-07	0.0004	1.372E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.754E-06	0.0022
U-235	6.110E-06	0.0076	1.091E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.619E-08	0.0000
U-238	1.064E-05	0.0133	8.595E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.780E-07	0.0002
Total	7.914E-04	0.9905	2.136E-06	0.0027	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.473E-06	0.0069

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.775E-06	0.0035
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.971E-06	0.0025
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.619E-04	0.9536
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.180E-05	0.0148
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.461E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.137E-06	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.090E-05	0.0136
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.990E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	5.519E-03	0.000E+00	0.000E+00	0.000E+00	5.090E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.090E-01
Pa-231	2.735E-05	0.000E+00	0.000E+00	0.000E+00	2.522E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.522E-03
Pb-210	4.182E-01	0.000E+00	0.000E+00	0.000E+00	3.857E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.857E+01
Ra-226	3.594E-01	0.000E+00	0.000E+00	0.000E+00	3.314E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.314E+01
Th-230	5.310E-01	0.000E+00	0.000E+00	0.000E+00	4.897E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.897E+01
U-234	4.795E+00	0.000E+00	0.000E+00	0.000E+00	4.423E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.423E+02
U-235	4.284E-02	0.000E+00	0.000E+00	0.000E+00	3.951E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.951E+00
U-238	3.664E-01	0.000E+00	0.000E+00	0.000E+00	3.379E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.379E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.443E-06	0.0018	1.993E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.020E-08	0.0000
Pa-231	1.395E-09	0.0000	4.391E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.329E-11	0.0000
Pb-210	4.449E-07	0.0006	1.355E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.427E-06	0.0030
Ra-226	7.739E-04	0.9672	1.045E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.063E-07	0.0008
Th-230	1.151E-07	0.0001	3.786E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.475E-07	0.0003
U-234	3.202E-07	0.0004	1.359E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.737E-06	0.0022
U-235	6.050E-06	0.0076	1.075E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.601E-08	0.0000
U-238	1.054E-05	0.0132	8.515E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.764E-07	0.0002
Total	7.928E-04	0.9909	2.093E-06	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.220E-06	0.0065

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.473E-06	0.0018
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.472E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.007E-06	0.0038
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.746E-04	0.9681
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.411E-07	0.0009
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.416E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.077E-06	0.0076
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.080E-05	0.0135
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.001E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.436E-06	0.0018	1.984E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.015E-08	0.0000
Pb-210	1.557E-07	0.0002	4.740E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.493E-07	0.0011
Ra-226	7.534E-04	0.9416	1.882E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.141E-06	0.0027
Th-230	2.087E-05	0.0261	3.815E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.893E-07	0.0004
U-234	3.580E-07	0.0004	1.360E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.738E-06	0.0022
U-235	6.058E-06	0.0076	1.089E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.609E-08	0.0000
U-238	1.054E-05	0.0132	8.516E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.764E-07	0.0002
Total	7.928E-04	0.9909	2.093E-06	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.220E-06	0.0065

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.466E-06	0.0018
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.052E-06	0.0013
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.557E-04	0.9445
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.154E-05	0.0269
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.456E-06	0.0043
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.085E-06	0.0076
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.080E-05	0.0135
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.001E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	6.533E-04	0.000E+00	0.000E+00	0.000E+00	6.025E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.025E-02
Pa-231	8.944E-05	0.000E+00	0.000E+00	0.000E+00	8.249E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.249E-03
Pb-210	3.657E-01	0.000E+00	0.000E+00	0.000E+00	3.373E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.373E+01
Ra-226	3.641E-01	0.000E+00	0.000E+00	0.000E+00	3.358E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.358E+01
Th-230	5.326E-01	0.000E+00	0.000E+00	0.000E+00	4.912E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.912E+01
U-234	4.641E+00	0.000E+00	0.000E+00	0.000E+00	4.280E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.280E+02
U-235	4.146E-02	0.000E+00	0.000E+00	0.000E+00	3.824E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.824E+00
U-238	3.546E-01	0.000E+00	0.000E+00	0.000E+00	3.270E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.270E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.817E-07	0.0002	2.509E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.285E-09	0.0000
Pa-231	3.623E-09	0.0000	1.141E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.646E-11	0.0000
Pb-210	4.059E-07	0.0005	1.236E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.214E-06	0.0027
Ra-226	7.840E-04	0.9703	1.058E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.142E-07	0.0008
Th-230	1.154E-07	0.0001	3.797E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.482E-07	0.0003
U-234	3.099E-07	0.0004	1.315E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.681E-06	0.0021
U-235	5.856E-06	0.0072	1.041E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.549E-08	0.0000
U-238	1.020E-05	0.0126	8.241E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.707E-07	0.0002
Total	8.010E-04	0.9914	2.019E-06	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.945E-06	0.0061

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

	Water		Fish		Plant		Meat		Milk		All Pathways**	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.855E-07	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.823E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.744E-06	0.0034
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.847E-04	0.9711
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.433E-07	0.0009
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.305E-06	0.0041
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.882E-06	0.0073
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.045E-05	0.0129
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.080E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.539E-07	0.0002	2.126E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.088E-09	0.0000
Pb-210	1.731E-08	0.0000	5.271E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.442E-08	0.0001
Ra-226	7.301E-04	0.9035	2.106E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.581E-06	0.0032
Th-230	5.415E-05	0.0670	3.897E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.986E-07	0.0005
U-234	5.607E-07	0.0007	1.318E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.683E-06	0.0021
U-235	5.887E-06	0.0073	1.091E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.577E-08	0.0000
U-238	1.020E-05	0.0126	8.244E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.707E-07	0.0002

Total	8.010E-04	0.9914	2.019E-06	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.945E-06	0.0061

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.571E-07	0.0002
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.170E-07	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.328E-04	0.9070
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.494E-05	0.0680
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.562E-06	0.0044
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.914E-06	0.0073
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.045E-05	0.0129
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.080E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.298E-04	0.000E+00	0.000E+00	0.000E+00	2.119E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.119E-02
Pa-231	2.541E-04	0.000E+00	0.000E+00	0.000E+00	2.344E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.344E-02
Pb-210	3.714E-01	0.000E+00	0.000E+00	0.000E+00	3.426E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.426E+01
Ra-226	3.770E-01	0.000E+00	0.000E+00	0.000E+00	3.477E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.477E+01
Th-230	5.366E-01	0.000E+00	0.000E+00	0.000E+00	4.949E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.949E+01
U-234	4.225E+00	0.000E+00	0.000E+00	0.000E+00	3.896E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.896E+02
U-235	3.777E-02	0.000E+00	0.000E+00	0.000E+00	3.483E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.483E+00
U-238	3.230E-01	0.000E+00	0.000E+00	0.000E+00	2.979E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.979E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.052E-08	0.0001	1.251E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.401E-10	0.0000
Pa-231	9.532E-09	0.0000	3.001E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.275E-10	0.0000
Pb-210	4.147E-07	0.0005	1.263E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.262E-06	0.0027
Ra-226	8.115E-04	0.9733	1.095E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.358E-07	0.0008
Th-230	1.163E-07	0.0001	3.825E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.500E-07	0.0003
U-234	2.821E-07	0.0003	1.197E-06	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.530E-06	0.0018
U-235	5.334E-06	0.0064	9.481E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.411E-08	0.0000
U-238	9.292E-06	0.0111	7.507E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.555E-07	0.0002
Total	8.271E-04	0.9919	1.901E-06	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.848E-06	0.0058

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.241E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.006E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.803E-06	0.0034
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.123E-04	0.9742

Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.488E-07	0.0009
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.009E-06	0.0036
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.357E-06	0.0064
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.523E-06	0.0114
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.338E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.607E-10	0.0000	3.602E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.844E-12	0.0000
Pb-210	3.256E-11	0.0000	9.914E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.776E-10	0.0000
Ra-226	6.671E-04	0.8000	1.958E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.418E-06	0.0029
Th-230	1.432E-04	0.1717	4.130E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.185E-07	0.0009
U-234	2.088E-06	0.0025	1.206E-06	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.541E-06	0.0018
U-235	5.434E-06	0.0065	1.103E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.498E-08	0.0000
U-238	9.292E-06	0.0111	7.515E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.556E-07	0.0002
Total	8.271E-04	0.9919	1.901E-06	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.848E-06	0.0058

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.662E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.201E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.697E-04	0.8032
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.443E-04	0.1731
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.836E-06	0.0058
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.460E-06	0.0065
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.523E-06	0.0114
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.338E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	6.851E-04	0.000E+00	0.000E+00	0.000E+00	6.318E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.318E-02
Pa-231	7.031E-04	0.000E+00	0.000E+00	0.000E+00	6.484E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.484E-02
Pb-210	4.103E-01	0.000E+00	0.000E+00	0.000E+00	3.784E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.784E+01
Ra-226	4.158E-01	0.000E+00	0.000E+00	0.000E+00	3.834E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.834E+01
Th-230	5.452E-01	0.000E+00	0.000E+00	0.000E+00	5.028E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.028E+01
U-234	3.042E+00	0.000E+00	0.000E+00	0.000E+00	2.805E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.805E+02
U-235	2.724E-02	0.000E+00	0.000E+00	0.000E+00	2.513E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.513E+00
U-238	2.330E-01	0.000E+00	0.000E+00	0.000E+00	2.149E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.149E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	2.616E-07	0.0003	3.614E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.850E-09	0.0000
Pa-231	2.564E-08	0.0000	8.071E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.119E-10	0.0000
Pb-210	4.578E-07	0.0005	1.394E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.497E-06	0.0027
Ra-226	8.945E-04	0.9804	1.207E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.008E-07	0.0008
Th-230	1.181E-07	0.0001	3.885E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.540E-07	0.0003
U-234	2.031E-07	0.0002	8.619E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.102E-06	0.0012
U-235	3.848E-06	0.0042	6.839E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.018E-08	0.0000
U-238	6.703E-06	0.0073	5.415E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.122E-07	0.0001
Total	9.061E-04	0.9931	1.576E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.678E-06	0.0051

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.671E-07	0.0003
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.706E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.094E-06	0.0034
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.953E-04	0.9813
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.606E-07	0.0008
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.167E-06	0.0024
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.865E-06	0.0042
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.869E-06	0.0075
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.124E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.217E-20	0.0000	7.206E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.689E-22	0.0000
Pb-210	9.398E-21	0.0000	2.861E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.126E-20	0.0000
Ra-226	4.864E-04	0.5331	1.428E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.763E-06	0.0019
Th-230	3.934E-04	0.4312	4.769E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.620E-06	0.0018
U-234	1.541E-05	0.0169	8.906E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.170E-06	0.0013
U-235	4.135E-06	0.0045	1.126E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.264E-08	0.0000
U-238	6.704E-06	0.0073	5.434E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.124E-07	0.0001
Total	9.061E-04	0.9931	1.576E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.678E-06	0.0051

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.326E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.352E-20	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.883E-04	0.5352
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.955E-04	0.4335
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.747E-05	0.0192
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.159E-06	0.0046
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.871E-06	0.0075
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.124E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)

Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	1.763E-01	0.000E+00	0.000E+00	0.000E+00	4.203E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.203E+01
Ra-226	1.763E-01	0.000E+00	0.000E+00	0.000E+00	4.203E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.203E+01
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	7.201E-03	0.000E+00	0.000E+00	0.000E+00	1.717E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.717E+00
Th-230	2.528E-01	0.000E+00	0.000E+00	0.000E+00	6.027E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.027E+01
Th-232	7.201E-03	0.000E+00	0.000E+00	0.000E+00	1.717E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.717E+00
U-234	5.881E-02	0.000E+00	0.000E+00	0.000E+00	1.402E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.402E+01
U-235	6.901E-03	0.000E+00	0.000E+00	0.000E+00	1.645E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.645E+00
U-238	3.195E-02	0.000E+00	0.000E+00	0.000E+00	7.619E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.619E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.408E-10	0.0000	2.092E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.769E-12	0.0000
Pa-231	6.109E-11	0.0000	2.071E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.060E-12	0.0000
Pb-210	1.820E-07	0.0005	5.956E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.759E-06	0.0073
Ra-226	3.551E-04	0.9446	5.122E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.686E-07	0.0020
Ra-228	5.271E-06	0.0140	6.441E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.724E-08	0.0002
Th-228	9.175E-06	0.0244	1.782E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.404E-08	0.0001
Th-230	5.056E-08	0.0001	1.800E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.042E-07	0.0008
Th-232	6.014E-10	0.0000	7.790E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.910E-09	0.0000
U-234	3.638E-09	0.0000	1.673E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.528E-08	0.0001
U-235	9.069E-07	0.0024	1.739E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.692E-09	0.0000
U-238	8.619E-07	0.0023	7.454E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.992E-08	0.0001
Total	3.715E-04	0.9884	3.429E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.034E-06	0.0107

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

	Water		Fish		Plant		Meat		Milk		All Pathways**	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.456E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.722E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.000E-06	0.0080
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.559E-04	0.9468
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.339E-06	0.0142
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.217E-06	0.0245
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.347E-07	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.564E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.153E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.093E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.759E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.264E-07	0.0003	4.137E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.916E-06	0.0051
Ra-226	3.524E-04	0.9374	6.891E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.601E-06	0.0043
Th-228	1.464E-06	0.0039	2.843E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.835E-09	0.0000
Th-230	2.791E-06	0.0074	1.805E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.147E-07	0.0008
Th-232	1.298E-05	0.0345	2.341E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.736E-08	0.0003
U-234	3.687E-09	0.0000	1.673E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.528E-08	0.0001
U-235	9.071E-07	0.0024	1.743E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.699E-09	0.0000
U-238	8.619E-07	0.0023	7.455E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.992E-08	0.0001
Total	3.715E-04	0.9884	3.429E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.034E-06	0.0107

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.084E-06	0.0055
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.541E-04	0.9419
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.470E-06	0.0039
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.286E-06	0.0087
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.310E-05	0.0349
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.570E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.156E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.093E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.759E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.299E-09	0.000E+00	0.000E+00	0.000E+00	5.483E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.483E-07
Pa-231	1.460E-07	0.000E+00	0.000E+00	0.000E+00	3.481E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.481E-05
Pb-210	1.762E-01	0.000E+00	0.000E+00	0.000E+00	4.201E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.201E+01
Ra-226	1.763E-01	0.000E+00	0.000E+00	0.000E+00	4.204E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.204E+01
Ra-228	8.177E-04	0.000E+00	0.000E+00	0.000E+00	1.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.950E-01
Th-228	5.146E-03	0.000E+00	0.000E+00	0.000E+00	1.227E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.227E+00
Th-230	2.528E-01	0.000E+00	0.000E+00	0.000E+00	6.027E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.027E+01
Th-232	7.200E-03	0.000E+00	0.000E+00	0.000E+00	1.717E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.717E+00
U-234	5.880E-02	0.000E+00	0.000E+00	0.000E+00	1.402E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.402E+01
U-235	6.900E-03	0.000E+00	0.000E+00	0.000E+00	1.645E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.645E+00
U-238	3.195E-02	0.000E+00	0.000E+00	0.000E+00	7.618E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.618E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.572E-10	0.0000	2.336E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.092E-12	0.0000
Pa-231	6.597E-11	0.0000	2.237E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.384E-12	0.0000
Pb-210	1.819E-07	0.0005	5.954E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.758E-06	0.0073
Ra-226	3.552E-04	0.9438	5.123E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.687E-07	0.0020
Ra-228	5.546E-06	0.0147	6.778E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.076E-08	0.0002
Th-228	9.220E-06	0.0245	1.791E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.416E-08	0.0001
Th-230	5.056E-08	0.0001	1.800E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.042E-07	0.0008
Th-232	6.014E-10	0.0000	7.790E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.910E-09	0.0000
U-234	3.638E-09	0.0000	1.672E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.527E-08	0.0001
U-235	9.068E-07	0.0024	1.739E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.691E-09	0.0000
U-238	8.618E-07	0.0023	7.453E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.991E-08	0.0001
Total	3.719E-04	0.9884	3.430E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.037E-06	0.0107

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.627E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.259E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.999E-06	0.0080
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.560E-04	0.9460
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.618E-06	0.0149
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.262E-06	0.0246
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.347E-07	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.563E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.152E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.092E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.763E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of

Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.225E-07	0.0003	4.008E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.857E-06	0.0049
Ra-226	3.523E-04	0.9361	7.015E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.658E-06	0.0044
Th-228	1.019E-06	0.0027	1.979E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.669E-09	0.0000
Th-230	3.010E-06	0.0080	1.805E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.157E-07	0.0008
Th-232	1.375E-05	0.0365	2.440E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.022E-07	0.0003
U-234	3.693E-09	0.0000	1.673E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.528E-08	0.0001
U-235	9.070E-07	0.0024	1.743E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.698E-09	0.0000
U-238	8.618E-07	0.0023	7.453E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.992E-08	0.0001
Total	3.719E-04	0.9884	3.430E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.037E-06	0.0107

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.019E-06	0.0054
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.540E-04	0.9407
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E-06	0.0027
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.506E-06	0.0093
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.387E-05	0.0369
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.570E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.154E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.092E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.763E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.026E-08	0.000E+00	0.000E+00	0.000E+00	4.831E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.831E-06
Pa-231	4.378E-07	0.000E+00	0.000E+00	0.000E+00	1.044E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.044E-04
Pb-210	1.760E-01	0.000E+00	0.000E+00	0.000E+00	4.198E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.198E+01
Ra-226	1.764E-01	0.000E+00	0.000E+00	0.000E+00	4.205E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.205E+01
Ra-228	2.185E-03	0.000E+00	0.000E+00	0.000E+00	5.210E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.210E-01
Th-228	3.323E-03	0.000E+00	0.000E+00	0.000E+00	7.924E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.924E-01
Th-230	2.527E-01	0.000E+00	0.000E+00	0.000E+00	6.026E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.026E+01
Th-232	7.200E-03	0.000E+00	0.000E+00	0.000E+00	1.717E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.717E+00
U-234	5.878E-02	0.000E+00	0.000E+00	0.000E+00	1.402E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.402E+01
U-235	6.897E-03	0.000E+00	0.000E+00	0.000E+00	1.645E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.645E+00
U-238	3.194E-02	0.000E+00	0.000E+00	0.000E+00	7.615E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.615E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.933E-10	0.0000	2.873E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.802E-12	0.0000
Pa-231	7.572E-11	0.0000	2.568E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.033E-12	0.0000
Pb-210	1.818E-07	0.0005	5.951E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.756E-06	0.0073
Ra-226	3.553E-04	0.9416	5.124E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.689E-07	0.0020
Ra-228	6.008E-06	0.0159	7.341E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.664E-08	0.0002
Th-228	9.622E-06	0.0255	1.869E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.521E-08	0.0001
Th-230	5.056E-08	0.0001	1.800E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.041E-07	0.0008
Th-232	6.014E-10	0.0000	7.789E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.909E-09	0.0000
U-234	3.636E-09	0.0000	1.672E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.525E-08	0.0001
U-235	9.065E-07	0.0024	1.738E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.689E-09	0.0000
U-238	8.615E-07	0.0023	7.451E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.990E-08	0.0001
Total	3.729E-04	0.9884	3.438E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.043E-06	0.0107

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.000E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.332E-11	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.998E-06	0.0079
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.561E-04	0.9438
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.085E-06	0.0161
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.665E-06	0.0256
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.347E-07	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.560E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.149E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.089E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.773E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.150E-07	0.0003	3.763E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.743E-06	0.0046
Ra-226	3.519E-04	0.9328	7.250E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.769E-06	0.0047
Th-228	4.935E-07	0.0013	9.586E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.293E-09	0.0000
Th-230	3.447E-06	0.0091	1.806E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.178E-07	0.0008
Th-232	1.514E-05	0.0401	2.625E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.105E-07	0.0003
U-234	3.705E-09	0.0000	1.672E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.526E-08	0.0001
U-235	9.067E-07	0.0024	1.744E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.698E-09	0.0000
U-238	8.615E-07	0.0023	7.451E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.990E-08	0.0001
Total	3.729E-04	0.9884	3.438E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.043E-06	0.0107

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.896E-06	0.0050
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.538E-04	0.9377
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.958E-07	0.0013
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.945E-06	0.0105
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.527E-05	0.0405
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.569E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.152E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.089E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.773E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	2.093E-07	0.000E+00	0.000E+00	0.000E+00	4.991E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.991E-05
Pa-231	1.458E-06	0.000E+00	0.000E+00	0.000E+00	3.477E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.477E-04
Pb-210	1.756E-01	0.000E+00	0.000E+00	0.000E+00	4.187E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.187E+01
Ra-226	1.765E-01	0.000E+00	0.000E+00	0.000E+00	4.210E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.210E+01
Ra-228	5.042E-03	0.000E+00	0.000E+00	0.000E+00	1.202E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.202E+00
Th-228	4.255E-03	0.000E+00	0.000E+00	0.000E+00	1.015E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.015E+00
Th-230	2.526E-01	0.000E+00	0.000E+00	0.000E+00	6.024E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.024E+01
Th-232	7.198E-03	0.000E+00	0.000E+00	0.000E+00	1.716E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.716E+00
U-234	5.871E-02	0.000E+00	0.000E+00	0.000E+00	1.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.400E+01
U-235	6.890E-03	0.000E+00	0.000E+00	0.000E+00	1.643E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.643E+00
U-238	3.190E-02	0.000E+00	0.000E+00	0.000E+00	7.607E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.607E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.501E-10	0.0000	5.203E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.886E-12	0.0000
Pa-231	1.098E-10	0.0000	3.724E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.299E-12	0.0000
Pb-210	1.816E-07	0.0005	5.943E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.753E-06	0.0072
Ra-226	3.557E-04	0.9348	5.130E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.698E-07	0.0020
Ra-228	6.970E-06	0.0183	8.517E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.893E-08	0.0002
Th-228	1.142E-05	0.0300	2.219E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.993E-08	0.0001
Th-230	5.054E-08	0.0001	1.799E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.040E-07	0.0008
Th-232	6.012E-10	0.0000	7.787E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.906E-09	0.0000
U-234	3.632E-09	0.0000	1.670E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.519E-08	0.0001
U-235	9.055E-07	0.0024	1.736E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.681E-09	0.0000
U-238	8.606E-07	0.0023	7.443E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.986E-08	0.0001
Total	3.761E-04	0.9884	3.473E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.057E-06	0.0107

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.622E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.209E-10	0.0000

Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.994E-06	0.0079
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.565E-04	0.9370
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.060E-06	0.0186
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.148E-05	0.0302
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.345E-07	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.829E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.552E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.139E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.079E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.805E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
	Radionuclides							
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	9.220E-08	0.0002	3.018E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.398E-06	0.0037
Ra-226	3.508E-04	0.9221	7.960E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.103E-06	0.0055
Th-228	3.906E-08	0.0001	7.587E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E-10	0.0000
Th-230	4.974E-06	0.0131	1.808E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.261E-07	0.0009
Th-232	1.836E-05	0.0482	3.075E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.287E-07	0.0003
U-234	3.763E-09	0.0000	1.671E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.520E-08	0.0001
U-235	9.059E-07	0.0024	1.745E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.696E-09	0.0000
U-238	8.606E-07	0.0023	7.443E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.986E-08	0.0001
Total	3.761E-04	0.9884	3.473E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.057E-06	0.0107

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.520E-06	0.0040
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.530E-04	0.9278
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.924E-08	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.481E-06	0.0144
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.852E-05	0.0487
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.567E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.144E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.079E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.805E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.553E-06	0.000E+00	0.000E+00	0.000E+00	3.702E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.702E-04
Pa-231	4.362E-06	0.000E+00	0.000E+00	0.000E+00	1.040E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.040E-03
Pb-210	1.750E-01	0.000E+00	0.000E+00	0.000E+00	4.173E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.173E+01
Ra-226	1.771E-01	0.000E+00	0.000E+00	0.000E+00	4.223E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.223E+01
Ra-228	6.999E-03	0.000E+00	0.000E+00	0.000E+00	1.669E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.669E+00
Th-228	6.903E-03	0.000E+00	0.000E+00	0.000E+00	1.646E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.646E+00
Th-230	2.524E-01	0.000E+00	0.000E+00	0.000E+00	6.018E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.018E+01
Th-232	7.191E-03	0.000E+00	0.000E+00	0.000E+00	1.715E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.715E+00
U-234	5.853E-02	0.000E+00	0.000E+00	0.000E+00	1.396E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.396E+01

U-235	6.868E-03	0.000E+00	0.000E+00	0.000E+00	1.638E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.638E+00
U-238	3.180E-02	0.000E+00	0.000E+00	0.000E+00	7.583E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.583E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.914E-10	0.0000	1.473E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.950E-11	0.0000
Pa-231	2.069E-10	0.0000	7.017E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.375E-11	0.0000
Pb-210	1.813E-07	0.0005	5.934E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.749E-06	0.0072
Ra-226	3.568E-04	0.9294	5.146E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.722E-07	0.0020
Ra-228	7.626E-06	0.0199	9.319E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.729E-08	0.0003
Th-228	1.306E-05	0.0340	2.537E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.423E-08	0.0001
Th-230	5.049E-08	0.0001	1.797E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.037E-07	0.0008
Th-232	6.007E-10	0.0000	7.780E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.897E-09	0.0000
U-234	3.621E-09	0.0000	1.665E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.501E-08	0.0001
U-235	9.026E-07	0.0024	1.731E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.660E-09	0.0000
U-238	8.579E-07	0.0022	7.419E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.973E-08	0.0001
Total	3.795E-04	0.9885	3.504E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.067E-06	0.0106

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.026E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.277E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.989E-06	0.0078
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.576E-04	0.9315
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.724E-06	0.0201
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.312E-05	0.0342
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.339E-07	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.828E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.528E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.110E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.050E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.839E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.

Pb-210	4.906E-08	0.0001	1.606E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.438E-07	0.0019
Ra-226	3.476E-04	0.9056	9.271E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.725E-06	0.0071
Th-228	2.782E-11	0.0000	5.403E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.288E-14	0.0000
Th-230	9.305E-06	0.0242	1.817E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.562E-07	0.0009
Th-232	2.069E-05	0.0539	3.408E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.414E-07	0.0004
U-234	4.049E-09	0.0000	1.666E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.504E-08	0.0001
U-235	9.038E-07	0.0024	1.753E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.694E-09	0.0000
U-238	8.579E-07	0.0022	7.420E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.974E-08	0.0001
Total	3.795E-04	0.9885	3.504E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.067E-06	0.0106

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.089E-07	0.0021
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.505E-04	0.9130
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.794E-11	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.843E-06	0.0256
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.086E-05	0.0544
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.575E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.123E-07	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.050E-07	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.839E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.007E-05	0.000E+00	0.000E+00	0.000E+00	2.402E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.402E-03
Pa-231	1.440E-05	0.000E+00	0.000E+00	0.000E+00	3.434E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.434E-03
Pb-210	1.757E-01	0.000E+00	0.000E+00	0.000E+00	4.189E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.189E+01
Ra-226	1.790E-01	0.000E+00	0.000E+00	0.000E+00	4.268E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.268E+01
Ra-228	7.170E-03	0.000E+00	0.000E+00	0.000E+00	1.710E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.710E+00
Th-228	7.170E-03	0.000E+00	0.000E+00	0.000E+00	1.710E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.710E+00
Th-230	2.515E-01	0.000E+00	0.000E+00	0.000E+00	5.997E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.997E+01
Th-232	7.169E-03	0.000E+00	0.000E+00	0.000E+00	1.710E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.710E+00
U-234	5.788E-02	0.000E+00	0.000E+00	0.000E+00	1.380E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.380E+01
U-235	6.793E-03	0.000E+00	0.000E+00	0.000E+00	1.620E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.620E+00
U-238	3.145E-02	0.000E+00	0.000E+00	0.000E+00	7.500E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.500E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.147E-09	0.0000	6.163E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.156E-11	0.0000
Pa-231	5.426E-10	0.0000	1.840E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.606E-11	0.0000
Pb-210	1.824E-07	0.0005	5.970E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.765E-06	0.0071
Ra-226	3.605E-04	0.9297	5.201E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.804E-07	0.0020
Ra-228	7.668E-06	0.0198	9.370E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.783E-08	0.0003
Th-228	1.319E-05	0.0340	2.562E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.456E-08	0.0001
Th-230	5.031E-08	0.0001	1.791E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.027E-07	0.0008
Th-232	5.988E-10	0.0000	7.757E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.867E-09	0.0000
U-234	3.581E-09	0.0000	1.646E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.440E-08	0.0001

U-235	8.927E-07	0.0023	1.712E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.587E-09	0.0000
U-238	8.485E-07	0.0022	7.338E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.930E-08	0.0001
Total	3.834E-04	0.9885	3.507E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.091E-06	0.0105

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.290E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.971E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.007E-06	0.0078
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.614E-04	0.9318
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.767E-06	0.0200
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.325E-05	0.0342
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.320E-07	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.822E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.445E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.010E-07	0.0023
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.951E-07	0.0023
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.878E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	5.393E-09	0.0000	1.765E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.176E-08	0.0002
Ra-226	3.366E-04	0.8680	1.035E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.276E-06	0.0084
Th-228	2.681E-22	0.0000	5.208E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.025E-25	0.0000
Th-230	2.412E-05	0.0622	1.854E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.900E-07	0.0013
Th-232	2.086E-05	0.0538	3.431E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.423E-07	0.0004
U-234	6.449E-09	0.0000	1.650E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.448E-08	0.0001
U-235	8.974E-07	0.0023	1.792E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.705E-09	0.0000
U-238	8.485E-07	0.0022	7.340E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.931E-08	0.0001
Total	3.834E-04	0.9885	3.507E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.091E-06	0.0105

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.892E-08	0.0002
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.400E-04	0.8767
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.694E-22	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.480E-05	0.0639
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.104E-05	0.0542
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.744E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.059E-07	0.0023
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.951E-07	0.0023
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.878E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	3.768E-05	0.000E+00	0.000E+00	0.000E+00	8.984E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.984E-03
Pa-231	4.205E-05	0.000E+00	0.000E+00	0.000E+00	1.003E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.003E-02
Pb-210	1.805E-01	0.000E+00	0.000E+00	0.000E+00	4.305E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.305E+01
Ra-226	1.839E-01	0.000E+00	0.000E+00	0.000E+00	4.386E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.386E+01
Ra-228	7.108E-03	0.000E+00	0.000E+00	0.000E+00	1.695E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.695E+00
Th-228	7.108E-03	0.000E+00	0.000E+00	0.000E+00	1.695E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.695E+00
Th-230	2.490E-01	0.000E+00	0.000E+00	0.000E+00	5.937E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.937E+01
Th-232	7.107E-03	0.000E+00	0.000E+00	0.000E+00	1.695E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.695E+00
U-234	5.606E-02	0.000E+00	0.000E+00	0.000E+00	1.337E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.337E+01
U-235	6.582E-03	0.000E+00	0.000E+00	0.000E+00	1.569E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.569E+00
U-238	3.048E-02	0.000E+00	0.000E+00	0.000E+00	7.267E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.267E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.384E-08	0.0000	2.057E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.722E-10	0.0000
Pa-231	1.467E-09	0.0000	4.974E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.748E-11	0.0000
Pb-210	1.874E-07	0.0005	6.134E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.841E-06	0.0071
Ra-226	3.704E-04	0.9317	5.343E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.017E-07	0.0020
Ra-228	7.602E-06	0.0191	9.289E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.698E-08	0.0002
Th-228	1.308E-05	0.0329	2.540E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.426E-08	0.0001
Th-230	4.980E-08	0.0001	1.773E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.996E-07	0.0008
Th-232	5.936E-10	0.0000	7.689E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.781E-09	0.0000
U-234	3.469E-09	0.0000	1.595E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.270E-08	0.0001
U-235	8.650E-07	0.0022	1.659E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.382E-09	0.0000
U-238	8.221E-07	0.0021	7.110E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.808E-08	0.0001
Total	3.930E-04	0.9886	3.510E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.181E-06	0.0105

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.432E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.614E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.090E-06	0.0078
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.713E-04	0.9339
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.700E-06	0.0194
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.314E-05	0.0330
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.267E-07	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.806E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.211E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.730E-07	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.673E-07	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.976E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	9.821E-12	0.0000	3.215E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.489E-10	0.0000
Ra-226	3.070E-04	0.7722	9.604E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.062E-06	0.0077
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	6.362E-05	0.1600	1.959E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.798E-07	0.0022
Th-232	2.068E-05	0.0520	3.402E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.410E-07	0.0004
U-234	2.451E-08	0.0001	1.606E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.305E-08	0.0001
U-235	8.803E-07	0.0022	1.914E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.752E-09	0.0000
U-238	8.221E-07	0.0021	7.117E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.810E-08	0.0001
Total	3.930E-04	0.9886	3.510E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.181E-06	0.0105

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.619E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.102E-04	0.7802
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.469E-05	0.1627
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.085E-05	0.0525
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.362E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.889E-07	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.673E-07	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.976E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.235E-04	0.000E+00	0.000E+00	0.000E+00	2.946E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.946E-02
Pa-231	1.274E-04	0.000E+00	0.000E+00	0.000E+00	3.038E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.038E-02
Pb-210	1.933E-01	0.000E+00	0.000E+00	0.000E+00	4.608E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.608E+01
Ra-226	1.966E-01	0.000E+00	0.000E+00	0.000E+00	4.687E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.687E+01
Ra-228	6.895E-03	0.000E+00	0.000E+00	0.000E+00	1.644E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.644E+00
Th-228	6.895E-03	0.000E+00	0.000E+00	0.000E+00	1.644E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.644E+00
Th-230	2.403E-01	0.000E+00	0.000E+00	0.000E+00	5.730E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.730E+01
Th-232	6.894E-03	0.000E+00	0.000E+00	0.000E+00	1.644E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.644E+00
U-234	5.016E-02	0.000E+00	0.000E+00	0.000E+00	1.196E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.196E+01
U-235	5.893E-03	0.000E+00	0.000E+00	0.000E+00	1.405E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.405E+00
U-238	2.729E-02	0.000E+00	0.000E+00	0.000E+00	6.507E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.507E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.392E-08	0.0001	6.527E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.638E-10	0.0000
Pa-231	4.320E-09	0.0000	1.465E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.871E-10	0.0000
Pb-210	2.005E-07	0.0005	6.562E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.040E-06	0.0072
Ra-226	3.955E-04	0.9369	5.705E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.561E-07	0.0020
Ra-228	7.373E-06	0.0175	9.010E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.407E-08	0.0002
Th-228	1.268E-05	0.0300	2.464E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.323E-08	0.0001
Th-230	4.807E-08	0.0001	1.711E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.892E-07	0.0007
Th-232	5.758E-10	0.0000	7.459E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.488E-09	0.0000
U-234	3.103E-09	0.0000	1.427E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.715E-08	0.0001
U-235	7.745E-07	0.0018	1.485E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.715E-09	0.0000
U-238	7.361E-07	0.0017	6.366E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.409E-08	0.0001
Total	4.174E-04	0.9887	3.497E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.410E-06	0.0104

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.544E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.754E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.306E-06	0.0078
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.964E-04	0.9391
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.468E-06	0.0177
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.274E-05	0.0302
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.084E-07	0.0012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.752E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.451E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.817E-07	0.0019
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.766E-07	0.0018
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.221E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	2.531E-21	0.0000	8.283E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.837E-20	0.0000
Ra-226	2.223E-04	0.5267	6.955E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.218E-06	0.0053
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.732E-04	0.4104	2.238E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.965E-06	0.0047
Th-232	2.006E-05	0.0475	3.300E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-07	0.0003
U-234	1.922E-07	0.0005	1.464E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.944E-08	0.0001
U-235	8.227E-07	0.0019	2.284E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.866E-09	0.0000
U-238	7.362E-07	0.0017	6.389E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.417E-08	0.0001
Total	4.174E-04	0.9887	3.497E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.410E-06	0.0104

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.173E-20	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.246E-04	0.5321
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.754E-04	0.4156
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.023E-05	0.0479
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.563E-07	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.319E-07	0.0020
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.768E-07	0.0018
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.221E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents
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Part III: Intake Quantities and Health Risk Factors
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Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)

Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.093E-02	0.000E+00	0.000E+00	0.000E+00	1.313E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.313E-01
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	2.845E-01	0.000E+00	0.000E+00	0.000E+00	3.415E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.415E+00
Ra-226	2.845E-01	0.000E+00	0.000E+00	0.000E+00	3.415E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.415E+00
Ra-228	2.835E-03	0.000E+00	0.000E+00	0.000E+00	3.403E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.403E-02
Th-228	2.227E-02	0.000E+00	0.000E+00	0.000E+00	2.674E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.674E-01
Th-230	2.440E-01	0.000E+00	0.000E+00	0.000E+00	2.929E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.929E+00
Th-232	1.255E-02	0.000E+00	0.000E+00	0.000E+00	1.507E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.507E-01
U-234	4.900E-02	0.000E+00	0.000E+00	0.000E+00	5.883E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.883E-01
U-235	1.579E-02	0.000E+00	0.000E+00	0.000E+00	1.896E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.896E-01
U-238	1.006E-01	0.000E+00	0.000E+00	0.000E+00	1.208E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.208E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.401E-06	0.0042	4.412E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.940E-09	0.0000
Pa-231	1.623E-10	0.0000	6.797E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.707E-13	0.0000
Pb-210	3.018E-07	0.0005	1.153E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.689E-07	0.0005
Ra-226	5.346E-04	0.9359	9.887E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.470E-08	0.0001
Ra-228	9.976E-06	0.0175	1.558E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.193E-09	0.0000
Th-228	1.833E-05	0.0321	4.660E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.165E-09	0.0000
Th-230	4.900E-08	0.0001	2.085E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.774E-08	0.0000
Th-232	1.078E-09	0.0000	1.630E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-09	0.0000
U-234	3.114E-09	0.0000	1.662E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.765E-09	0.0000
U-235	2.017E-06	0.0035	4.745E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.194E-10	0.0000
U-238	2.569E-06	0.0045	2.799E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.547E-09	0.0000
Total	5.702E-04	0.9983	5.806E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.879E-07	0.0007

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.448E-06	0.0043
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.698E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.860E-07	0.0012
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.348E-04	0.9362
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.986E-06	0.0175
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.838E-05	0.0322
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-07	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.842E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.250E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.023E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.605E-06	0.0046
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.712E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.400E-06	0.0042	4.411E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.940E-09	0.0000
Pb-210	1.962E-07	0.0003	7.497E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.748E-07	0.0003
Ra-226	5.317E-04	0.9309	1.385E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.680E-07	0.0003
Ra-228	2.035E-06	0.0036	3.346E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.482E-10	0.0000
Th-228	3.458E-06	0.0061	8.790E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.970E-10	0.0000
Th-230	3.018E-06	0.0053	2.092E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.853E-08	0.0000
Th-232	2.282E-05	0.0399	5.232E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.096E-08	0.0000
U-234	3.168E-09	0.0000	1.662E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.765E-09	0.0000
U-235	2.018E-06	0.0035	4.760E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.206E-10	0.0000
U-238	2.569E-06	0.0045	2.799E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.547E-09	0.0000
Total	5.702E-04	0.9983	5.806E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.879E-07	0.0007

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.447E-06	0.0043
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.461E-07	0.0008
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.320E-04	0.9314
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.039E-06	0.0036
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.467E-06	0.0061
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.245E-06	0.0057
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.288E-05	0.0401
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.024E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.605E-06	0.0046
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.712E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Water Independent Pathways (Inhalation w/o radon) Water Dependent Pathways

Radio- Total

Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.059E-02	0.000E+00	0.000E+00	0.000E+00	1.271E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.271E-01
Pa-231	3.340E-07	0.000E+00	0.000E+00	0.000E+00	4.011E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.011E-06
Pb-210	2.844E-01	0.000E+00	0.000E+00	0.000E+00	3.414E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.414E+00
Ra-226	2.844E-01	0.000E+00	0.000E+00	0.000E+00	3.415E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.415E+00
Ra-228	3.938E-03	0.000E+00	0.000E+00	0.000E+00	4.728E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.728E-02
Th-228	1.654E-02	0.000E+00	0.000E+00	0.000E+00	1.986E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.986E-01
Th-230	2.440E-01	0.000E+00	0.000E+00	0.000E+00	2.929E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.929E+00
Th-232	1.255E-02	0.000E+00	0.000E+00	0.000E+00	1.507E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.507E-01
U-234	4.897E-02	0.000E+00	0.000E+00	0.000E+00	5.879E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.879E-01
U-235	1.578E-02	0.000E+00	0.000E+00	0.000E+00	1.895E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.895E-01
U-238	1.006E-01	0.000E+00	0.000E+00	0.000E+00	1.207E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.207E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.325E-06	0.0041	4.274E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.848E-09	0.0000
Pa-231	1.731E-10	0.0000	7.248E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.153E-13	0.0000
Pb-210	3.017E-07	0.0005	1.153E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.688E-07	0.0005
Ra-226	5.345E-04	0.9362	9.886E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.470E-08	0.0001
Ra-228	1.027E-05	0.0180	1.605E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.438E-09	0.0000
Th-228	1.794E-05	0.0314	4.560E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.097E-09	0.0000
Th-230	4.899E-08	0.0001	2.085E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.774E-08	0.0000
Th-232	1.078E-09	0.0000	1.630E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-09	0.0000
U-234	3.112E-09	0.0000	1.661E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.763E-09	0.0000
U-235	2.016E-06	0.0035	4.742E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.188E-10	0.0000
U-238	2.568E-06	0.0045	2.797E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.543E-09	0.0000
Total	5.700E-04	0.9983	5.782E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.879E-07	0.0007

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.371E-06	0.0042
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.810E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.859E-07	0.0012
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.347E-04	0.9365
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.028E-05	0.0180
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.799E-05	0.0315
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-07	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.842E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.248E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.022E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.603E-06	0.0046
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.710E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
   and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.325E-06	0.0041	4.273E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.847E-09	0.0000
Pb-210	1.902E-07	0.0003	7.265E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.694E-07	0.0003
Ra-226	5.315E-04	0.9308	1.407E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.733E-07	0.0003
Ra-228	1.929E-06	0.0034	3.285E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.735E-10	0.0000
Th-228	2.407E-06	0.0042	6.118E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.156E-10	0.0000
Th-230	3.215E-06	0.0056	2.092E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.859E-08	0.0000
Th-232	2.388E-05	0.0418	5.410E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.139E-08	0.0000
U-234	3.172E-09	0.0000	1.661E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.764E-09	0.0000
U-235	2.017E-06	0.0035	4.758E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.201E-10	0.0000
U-238	2.568E-06	0.0045	2.797E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.543E-09	0.0000
Total	5.700E-04	0.9983	5.782E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.879E-07	0.0007

1RESRAD, Version 6.21   T« Limit = 0.5 year   01/28/2003 11:02 Page 11
Intrisk : Painesville EU 5 - Industrial 2001   File: Pnveu5i2002.rad

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.370E-06	0.0042
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.323E-07	0.0008
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.318E-04	0.9314
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.933E-06	0.0034
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.413E-06	0.0042
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.443E-06	0.0060
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.394E-05	0.0419
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.022E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.603E-06	0.0046
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.710E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

1RESRAD, Version 6.21   T« Limit = 0.5 year   01/28/2003 11:02 Page 12
Intrisk : Painesville EU 5 - Industrial 2001   File: Pnveu5i2002.rad

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	9.935E-03	0.000E+00	0.000E+00	0.000E+00	1.193E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.193E-01
Pa-231	1.001E-06	0.000E+00	0.000E+00	0.000E+00	1.202E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.202E-05
Pb-210	2.842E-01	0.000E+00	0.000E+00	0.000E+00	3.412E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.412E+00
Ra-226	2.844E-01	0.000E+00	0.000E+00	0.000E+00	3.415E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.415E+00
Ra-228	5.783E-03	0.000E+00	0.000E+00	0.000E+00	6.944E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.944E-02
Th-228	1.060E-02	0.000E+00	0.000E+00	0.000E+00	1.272E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.272E-01
Th-230	2.439E-01	0.000E+00	0.000E+00	0.000E+00	2.929E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.929E+00
Th-232	1.255E-02	0.000E+00	0.000E+00	0.000E+00	1.507E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.507E-01
U-234	4.892E-02	0.000E+00	0.000E+00	0.000E+00	5.873E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.873E-01
U-235	1.577E-02	0.000E+00	0.000E+00	0.000E+00	1.893E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.893E-01
U-238	1.005E-01	0.000E+00	0.000E+00	0.000E+00	1.206E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.206E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.182E-06	0.0038	4.010E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.672E-09	0.0000
Pa-231	1.946E-10	0.0000	8.150E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.043E-13	0.0000
Pb-210	3.016E-07	0.0005	1.152E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.687E-07	0.0005
Ra-226	5.344E-04	0.9358	9.885E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.469E-08	0.0001
Ra-228	1.077E-05	0.0189	1.683E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.847E-09	0.0000
Th-228	1.784E-05	0.0312	4.535E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.080E-09	0.0000
Th-230	4.899E-08	0.0001	2.084E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.774E-08	0.0000
Th-232	1.078E-09	0.0000	1.630E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-09	0.0000
U-234	3.108E-09	0.0000	1.659E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.760E-09	0.0000
U-235	2.014E-06	0.0035	4.737E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.178E-10	0.0000
U-238	2.565E-06	0.0045	2.794E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.534E-09	0.0000
Total	5.702E-04	0.9983	5.752E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.880E-07	0.0007

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.224E-06	0.0039
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.036E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.855E-07	0.0012
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.346E-04	0.9361
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.078E-05	0.0189
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.789E-05	0.0313
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-07	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.842E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.246E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.019E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.600E-06	0.0046
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.711E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.181E-06	0.0038	4.008E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.671E-09	0.0000
Pb-210	1.786E-07	0.0003	6.822E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.591E-07	0.0003
Ra-226	5.310E-04	0.9297	1.450E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.833E-07	0.0003
Ra-228	1.654E-06	0.0029	2.933E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.316E-10	0.0000
Th-228	1.166E-06	0.0020	2.964E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.013E-10	0.0000
Th-230	3.610E-06	0.0063	2.093E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.872E-08	0.0000
Th-232	2.579E-05	0.0452	5.743E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.214E-08	0.0000
U-234	3.181E-09	0.0000	1.659E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.761E-09	0.0000
U-235	2.015E-06	0.0035	4.755E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.193E-10	0.0000
U-238	2.565E-06	0.0045	2.794E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.535E-09	0.0000
Total	5.702E-04	0.9983	5.752E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.880E-07	0.0007

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Water Fish Radon Plant Meat Milk All pathways

Radio-Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.224E-06	0.0039
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.059E-07	0.0007
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.313E-04	0.9303
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.658E-06	0.0029
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.169E-06	0.0020
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.838E-06	0.0067
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.586E-05	0.0453
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.253E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.020E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.600E-06	0.0046
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.711E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					
Radio-Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	7.946E-03	0.000E+00	0.000E+00	0.000E+00	9.540E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.540E-02
Pa-231	3.330E-06	0.000E+00	0.000E+00	0.000E+00	3.999E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.999E-05
Pb-210	2.836E-01	0.000E+00	0.000E+00	0.000E+00	3.404E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.404E+00
Ra-226	2.842E-01	0.000E+00	0.000E+00	0.000E+00	3.413E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.413E+00
Ra-228	9.639E-03	0.000E+00	0.000E+00	0.000E+00	1.157E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.157E-01
Th-228	8.836E-03	0.000E+00	0.000E+00	0.000E+00	1.061E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.061E-01
Th-230	2.439E-01	0.000E+00	0.000E+00	0.000E+00	2.928E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.928E+00
Th-232	1.255E-02	0.000E+00	0.000E+00	0.000E+00	1.507E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.507E-01
U-234	4.872E-02	0.000E+00	0.000E+00	0.000E+00	5.850E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.850E-01
U-235	1.570E-02	0.000E+00	0.000E+00	0.000E+00	1.885E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.885E-01
U-238	1.001E-01	0.000E+00	0.000E+00	0.000E+00	1.201E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.201E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

	Radionuclides							
Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

	Ground		Inhalation		Plant		Meat		Milk		Soil	
Radio-Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.745E-06	0.0030	3.208E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.137E-09	0.0000
Pa-231	2.698E-10	0.0000	1.130E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.115E-12	0.0000
Pb-210	3.011E-07	0.0005	1.150E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.683E-07	0.0005
Ra-226	5.341E-04	0.9324	9.879E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.464E-08	0.0001
Ra-228	1.181E-05	0.0206	1.845E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.700E-09	0.0000
Th-228	1.929E-05	0.0337	4.903E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.331E-09	0.0000
Th-230	4.898E-08	0.0001	2.084E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.773E-08	0.0000
Th-232	1.077E-09	0.0000	1.629E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-09	0.0000
U-234	3.096E-09	0.0000	1.652E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.749E-09	0.0000
U-235	2.006E-06	0.0035	4.718E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.142E-10	0.0000
U-238	2.555E-06	0.0045	2.783E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.504E-09	0.0000
Total	5.719E-04	0.9983	5.705E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.880E-07	0.0007

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

	Water		Fish		Plant		Meat		Milk		All Pathways**	
Radio-Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.780E-06	0.0031
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.822E-10	0.0000

Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.844E-07	0.0012
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.343E-04	0.9327
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.182E-05	0.0206
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.934E-05	0.0338
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.751E-07	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.841E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.237E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.011E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.590E-06	0.0045
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.729E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.744E-06	0.0030	3.206E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.136E-09	0.0000
Pb-210	1.433E-07	0.0003	5.474E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.277E-07	0.0002
Ra-226	5.294E-04	0.9241	1.578E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.137E-07	0.0004
Ra-228	7.893E-07	0.0014	1.459E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.851E-10	0.0000
Th-228	9.228E-08	0.0002	2.346E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.593E-11	0.0000
Th-230	4.987E-06	0.0087	2.096E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.923E-08	0.0000
Th-232	3.022E-05	0.0528	6.548E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.377E-08	0.0000
U-234	3.222E-09	0.0000	1.653E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.750E-09	0.0000
U-235	2.007E-06	0.0035	4.747E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.164E-10	0.0000
U-238	2.555E-06	0.0045	2.783E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.505E-09	0.0000
Total	5.719E-04	0.9983	5.705E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.880E-07	0.0007

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.779E-06	0.0031
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.257E-07	0.0006
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.297E-04	0.9247
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.911E-07	0.0014
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.253E-08	0.0002
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.216E-06	0.0091
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.030E-05	0.0529
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.250E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.013E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.590E-06	0.0045
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.729E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	4.200E-03	0.000E+00	0.000E+00	0.000E+00	5.043E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.043E-02
Pa-231	9.926E-06	0.000E+00	0.000E+00	0.000E+00	1.192E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.192E-04
Pb-210	2.822E-01	0.000E+00	0.000E+00	0.000E+00	3.389E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.389E+00
Ra-226	2.838E-01	0.000E+00	0.000E+00	0.000E+00	3.407E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.407E+00
Ra-228	1.228E-02	0.000E+00	0.000E+00	0.000E+00	1.474E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.474E-01

Th-228	1.215E-02	0.000E+00	0.000E+00	0.000E+00	1.459E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.459E-01
Th-230	2.437E-01	0.000E+00	0.000E+00	0.000E+00	2.926E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.926E+00
Th-232	1.254E-02	0.000E+00	0.000E+00	0.000E+00	1.506E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.506E-01
U-234	4.818E-02	0.000E+00	0.000E+00	0.000E+00	5.784E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.784E-01
U-235	1.553E-02	0.000E+00	0.000E+00	0.000E+00	1.864E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.864E-01
U-238	9.893E-02	0.000E+00	0.000E+00	0.000E+00	1.188E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.188E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.237E-07	0.0016	1.698E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.131E-09	0.0000
Pa-231	4.826E-10	0.0000	2.021E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.995E-12	0.0000
Pb-210	3.000E-07	0.0005	1.146E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.673E-07	0.0005
Ra-226	5.333E-04	0.9299	9.863E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.452E-08	0.0001
Ra-228	1.252E-05	0.0218	1.956E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.028E-08	0.0000
Th-228	2.098E-05	0.0366	5.332E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.622E-09	0.0000
Th-230	4.894E-08	0.0001	2.082E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.772E-08	0.0000
Th-232	1.077E-09	0.0000	1.628E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-09	0.0000
U-234	3.061E-09	0.0000	1.634E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.719E-09	0.0000
U-235	1.983E-06	0.0035	4.665E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.039E-10	0.0000
U-238	2.526E-06	0.0044	2.752E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.420E-09	0.0000
Total	5.725E-04	0.9984	5.585E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.867E-07	0.0007

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.418E-07	0.0016
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.048E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.819E-07	0.0012
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.334E-04	0.9302
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.253E-05	0.0219
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.103E-05	0.0367
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.749E-07	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.840E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.212E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.989E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.561E-06	0.0045
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.735E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

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0            Ground          Inhalation          Radon            Plant             Meat              Milk              Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide    risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
 Ac-227  9.213E-07 0.0016  1.693E-08 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.128E-09 0.0000
 Pb-210  7.640E-08 0.0001  2.919E-08 0.0001  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  6.807E-08 0.0001
 Ra-226  5.246E-04 0.9148  1.815E-07 0.0003  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  2.704E-07 0.0005
 Ra-228  7.236E-08 0.0001  1.349E-10 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  2.584E-11 0.0000
 Th-228  6.573E-11 0.0000  1.671E-13 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.135E-14 0.0000
 Th-230  8.897E-06 0.0155  2.107E-07 0.0004  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  2.104E-08 0.0000
 Th-232  3.342E-05 0.0583  7.143E-08 0.0001  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.492E-08 0.0000
 U-234   3.436E-09 0.0000  1.635E-08 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  2.719E-09 0.0000
 U-235   1.986E-06 0.0035  4.729E-09 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  9.088E-10 0.0000
 U-238   2.526E-06 0.0044  2.752E-08 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  7.421E-09 0.0000
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 Total   5.725E-04 0.9984  5.585E-07 0.0010  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  3.867E-07 0.0007
1RESRAD, Version 6.21     T« Limit = 0.5 year       01/28/2003  11:02  Page  23
 Intrisk : Painesville EU 5 - Industrial 2001             File: Pnveu5i2002.rad

                  Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
                                       and Fraction of Total Risk at t= 3.000E+01 years

                                                 Water Dependent Pathways

             Water             Fish             Radon            Plant             Meat              Milk          All pathways
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide    risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
 Ac-227  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  9.394E-07 0.0016
 Pb-210  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.737E-07 0.0003
 Ra-226  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  5.251E-04 0.9156
 Ra-228  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  7.252E-08 0.0001
 Th-228  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  6.591E-11 0.0000
 Th-230  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  9.129E-06 0.0159
 Th-232  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  3.351E-05 0.0584
 U-234   0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  2.251E-08 0.0000
 U-235   0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.992E-06 0.0035
 U-238   0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  2.561E-06 0.0045
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 Total   0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  5.735E-04 1.0000

 ***CNRSI(i,p,t) includes contribution from decay daughter radionuclides
1RESRAD, Version 6.21     T« Limit = 0.5 year       01/28/2003  11:02  Page  24
 Intrisk : Painesville EU 5 - Industrial 2001             File: Pnveu5i2002.rad

                     Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
                                                  As pCi/yr at t= 1.000E+02 years

          Water Independent Pathways (Inhalation w/o radon)                    Water Dependent Pathways
 Radio-   ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ    Total
 Nuclide  Inhalation   Plant      Meat       Milk       Soil       Water      Fish       Plant      Meat       Milk     Ingestion*
 ÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
 Ac-227    4.721E-04  0.000E+00  0.000E+00  0.000E+00  5.668E-03  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  5.668E-03
 Pa-231    3.233E-05  0.000E+00  0.000E+00  0.000E+00  3.882E-04  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  3.882E-04
 Pb-210    2.797E-01  0.000E+00  0.000E+00  0.000E+00  3.359E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  3.359E+00
 Ra-226    2.821E-01  0.000E+00  0.000E+00  0.000E+00  3.387E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  3.387E+00
 Ra-228    1.251E-02  0.000E+00  0.000E+00  0.000E+00  1.502E-01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.502E-01
 Th-228    1.251E-02  0.000E+00  0.000E+00  0.000E+00  1.502E-01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.502E-01
 Th-230    2.430E-01  0.000E+00  0.000E+00  0.000E+00  2.917E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  2.917E+00
 Th-232    1.251E-02  0.000E+00  0.000E+00  0.000E+00  1.502E-01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.502E-01
 U-234     4.631E-02  0.000E+00  0.000E+00  0.000E+00  5.560E-01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  5.560E-01
 U-235     1.492E-02  0.000E+00  0.000E+00  0.000E+00  1.792E-01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.792E-01
 U-238     9.509E-02  0.000E+00  0.000E+00  0.000E+00  1.142E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.142E+00
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 * Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
   and water-dependent water, fish, plant, meat, milk pathways
0

          Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
                     Radon and its Decay Products as pCi/yr at t= 1.000E+02 years
0                                                Radionuclides
   Radon     ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
   Pathway     Rn-222     Po-218     Pb-214     Bi-214     Rn-220     Po-216     Pb-212     Bi-212
 ÄÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
  Water-ind.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
  Water-dep.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
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  Total       0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00

  Water-ind. == Water-independent    Water-dep. == Water-dependent
1RESRAD, Version 6.21     T« Limit = 0.5 year       01/28/2003  11:02  Page  25
 Intrisk : Painesville EU 5 - Industrial 2001             File: Pnveu5i2002.rad

                  Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
                                 and Fraction of Total Risk at t= 1.000E+02 years
0                                       Water Independent Pathways (Inhalation excludes radon)
0            Ground          Inhalation          Plant             Meat              Milk              Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide    risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
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Ac-227	1.080E-07	0.0002	1.984E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.322E-10	0.0000
Pa-231	1.206E-09	0.0000	5.049E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.983E-12	0.0000
Pb-210	2.977E-07	0.0005	1.137E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.652E-07	0.0005
Ra-226	5.302E-04	0.9309	9.806E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.409E-08	0.0001
Ra-228	1.256E-05	0.0221	1.962E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.031E-08	0.0000
Th-228	2.110E-05	0.0371	5.365E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.644E-09	0.0000
Th-230	4.879E-08	0.0001	2.076E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.767E-08	0.0000
Th-232	1.074E-09	0.0000	1.624E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.040E-09	0.0000
U-234	2.943E-09	0.0000	1.571E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.613E-09	0.0000
U-235	1.906E-06	0.0033	4.483E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.687E-10	0.0000
U-238	2.428E-06	0.0043	2.645E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.131E-09	0.0000
Total	5.686E-04	0.9984	5.399E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.827E-07	0.0007

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.101E-07	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.261E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.766E-07	0.0012
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.304E-04	0.9312
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.257E-05	0.0221
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.116E-05	0.0372
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.741E-07	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.836E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.126E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.911E-06	0.0034
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.461E-06	0.0043
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.696E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	9.865E-08	0.0002	1.813E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.208E-10	0.0000
Pb-210	8.457E-09	0.0000	3.231E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.535E-09	0.0000
Ra-226	5.082E-04	0.8923	2.010E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.205E-07	0.0006
Ra-228	1.564E-11	0.0000	2.915E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.584E-15	0.0000
Th-228	6.340E-22	0.0000	1.612E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-25	0.0000
Th-230	2.228E-05	0.0391	2.152E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.892E-08	0.0001
Th-232	3.366E-05	0.0591	7.185E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.500E-08	0.0000
U-234	5.246E-09	0.0000	1.574E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.616E-09	0.0000
U-235	1.917E-06	0.0034	4.705E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.851E-10	0.0000
U-238	2.428E-06	0.0043	2.646E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.133E-09	0.0000
Total	5.686E-04	0.9984	5.399E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.827E-07	0.0007

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All pathways risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.006E-07	0.0002
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.922E-08	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.088E-04	0.8932
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.567E-11	0.0000

Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.357E-22	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.252E-05	0.0395
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.375E-05	0.0593
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.360E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.922E-06	0.0034
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.461E-06	0.0043
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.696E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	8.265E-05	0.000E+00	0.000E+00	0.000E+00	9.923E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.923E-04
Pa-231	9.085E-05	0.000E+00	0.000E+00	0.000E+00	1.091E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.091E-03
Pb-210	2.751E-01	0.000E+00	0.000E+00	0.000E+00	3.303E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.303E+00
Ra-226	2.776E-01	0.000E+00	0.000E+00	0.000E+00	3.333E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.333E+00
Ra-228	1.243E-02	0.000E+00	0.000E+00	0.000E+00	1.492E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.492E-01
Th-228	1.243E-02	0.000E+00	0.000E+00	0.000E+00	1.492E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.492E-01
Th-230	2.410E-01	0.000E+00	0.000E+00	0.000E+00	2.893E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.893E+00
Th-232	1.243E-02	0.000E+00	0.000E+00	0.000E+00	1.492E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.492E-01
U-234	4.138E-02	0.000E+00	0.000E+00	0.000E+00	4.968E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.968E-01
U-235	1.332E-02	0.000E+00	0.000E+00	0.000E+00	1.600E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.600E-01
U-238	8.490E-02	0.000E+00	0.000E+00	0.000E+00	1.019E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.019E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.952E-08	0.0001	5.426E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.615E-11	0.0000
Pa-231	3.094E-09	0.0000	1.296E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-11	0.0000
Pb-210	2.928E-07	0.0005	1.119E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.609E-07	0.0005
Ra-226	5.217E-04	0.9311	9.650E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.291E-08	0.0001
Ra-228	1.247E-05	0.0223	1.949E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.024E-08	0.0000
Th-228	2.096E-05	0.0374	5.328E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.619E-09	0.0000
Th-230	4.839E-08	0.0001	2.059E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.752E-08	0.0000
Th-232	1.067E-09	0.0000	1.613E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.033E-09	0.0000
U-234	2.629E-09	0.0000	1.403E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.335E-09	0.0000
U-235	1.702E-06	0.0030	4.003E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.756E-10	0.0000
U-238	2.168E-06	0.0039	2.361E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.367E-09	0.0000
Total	5.594E-04	0.9984	5.279E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.758E-07	0.0007

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.010E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.236E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.656E-07	0.0012
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.219E-04	0.9314
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.249E-05	0.0223
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.102E-05	0.0375
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.718E-07	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.823E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.900E-08	0.0000

U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.707E-06	0.0030
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.198E-06	0.0039
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.603E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.666E-10	0.0000	3.062E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.041E-13	0.0000
Pb-210	1.571E-11	0.0000	6.000E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.399E-11	0.0000
Ra-226	4.640E-04	0.8282	1.864E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.995E-07	0.0005
Ra-228	5.270E-22	0.0000	9.823E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.882E-25	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	5.803E-05	0.1036	2.277E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.178E-08	0.0001
Th-232	3.343E-05	0.0597	7.136E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.490E-08	0.0000
U-234	1.862E-08	0.0000	1.412E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.349E-09	0.0000
U-235	1.734E-06	0.0031	4.672E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.244E-10	0.0000
U-238	2.168E-06	0.0039	2.364E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.372E-09	0.0000
Total	5.594E-04	0.9984	5.279E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.758E-07	0.0007

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.699E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.570E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.645E-04	0.8290
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.282E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.831E-05	0.1041
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.352E-05	0.0598
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.509E-08	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-06	0.0031
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.198E-06	0.0039
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.603E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.363E-04	0.000E+00	0.000E+00	0.000E+00	2.838E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.838E-03
Pa-231	2.423E-04	0.000E+00	0.000E+00	0.000E+00	2.909E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.909E-03
Pb-210	2.611E-01	0.000E+00	0.000E+00	0.000E+00	3.135E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.135E+00
Ra-226	2.635E-01	0.000E+00	0.000E+00	0.000E+00	3.164E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.164E+00
Ra-228	1.213E-02	0.000E+00	0.000E+00	0.000E+00	1.457E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.457E-01
Th-228	1.213E-02	0.000E+00	0.000E+00	0.000E+00	1.457E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.457E-01
Th-230	2.340E-01	0.000E+00	0.000E+00	0.000E+00	2.809E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.809E+00
Th-232	1.213E-02	0.000E+00	0.000E+00	0.000E+00	1.456E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.456E-01
U-234	2.789E-02	0.000E+00	0.000E+00	0.000E+00	3.348E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.348E-01
U-235	8.961E-03	0.000E+00	0.000E+00	0.000E+00	1.076E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.076E-01
U-238	5.710E-02	0.000E+00	0.000E+00	0.000E+00	6.855E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.855E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	8.150E-08	0.0002	1.498E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.981E-11	0.0000
Pa-231	7.978E-09	0.0000	3.341E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.298E-11	0.0000
Pb-210	2.779E-07	0.0005	1.062E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.476E-07	0.0005
Ra-226	4.953E-04	0.9313	9.161E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.922E-08	0.0001
Ra-228	1.218E-05	0.0229	1.903E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.000E-08	0.0000
Th-228	2.046E-05	0.0385	5.202E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.533E-09	0.0000
Th-230	4.699E-08	0.0001	1.999E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.701E-08	0.0000
Th-232	1.041E-09	0.0000	1.575E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.009E-09	0.0000
U-234	1.772E-09	0.0000	9.457E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.574E-09	0.0000
U-235	1.145E-06	0.0022	2.692E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.217E-10	0.0000
U-238	1.458E-06	0.0027	1.588E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.282E-09	0.0000
Total	5.310E-04	0.9984	4.973E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.549E-07	0.0007

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.310E-08	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.345E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.317E-07	0.0012
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.955E-04	0.9316
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.219E-05	0.0229
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.052E-05	0.0386
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.639E-07	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.780E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.280E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.148E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.478E-06	0.0028
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.318E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.300E-20	0.0000	6.065E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.042E-23	0.0000
Pb-210	4.336E-21	0.0000	1.656E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.863E-21	0.0000

Ra-226	3.375E-04	0.6346	1.356E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.178E-07	0.0004
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.580E-04	0.2972	2.618E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.159E-07	0.0002
Th-232	3.264E-05	0.0614	6.967E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.454E-08	0.0000
U-234	1.318E-07	0.0002	9.735E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.668E-09	0.0000
U-235	1.234E-06	0.0023	4.524E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.544E-10	0.0000
U-238	1.458E-06	0.0027	1.594E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.292E-09	0.0000
Total	5.310E-04	0.9984	4.973E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.549E-07	0.0007

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.365E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.855E-21	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.378E-04	0.6352
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.584E-04	0.2979
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.273E-05	0.0615
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.432E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.239E-06	0.0023
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.478E-06	0.0028
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.318E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)

Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.959E-02	0.000E+00	0.000E+00	0.000E+00	9.581E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.581E-01
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	8.984E-01	0.000E+00	0.000E+00	0.000E+00	2.909E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.909E+01
Ra-226	1.036E+00	0.000E+00	0.000E+00	0.000E+00	3.355E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.355E+01
Ra-228	2.249E-03	0.000E+00	0.000E+00	0.000E+00	7.282E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.282E-02
Th-228	9.586E-03	0.000E+00	0.000E+00	0.000E+00	3.104E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.104E-01
Th-230	2.302E+00	0.000E+00	0.000E+00	0.000E+00	7.456E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.456E+01
Th-232	1.148E-02	0.000E+00	0.000E+00	0.000E+00	3.718E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.718E-01
U-234	5.043E-01	0.000E+00	0.000E+00	0.000E+00	1.633E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.633E+01
U-235	4.533E-02	0.000E+00	0.000E+00	0.000E+00	1.468E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.468E+00
U-238	3.717E-01	0.000E+00	0.000E+00	0.000E+00	1.204E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.204E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	7.879E-06	0.0034	1.065E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.915E-08	0.0000
Pa-231	4.412E-10	0.0000	1.357E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.613E-12	0.0000
Pb-210	1.083E-06	0.0005	3.186E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.004E-06	0.0009
Ra-226	2.273E-03	0.9745	3.024E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.163E-07	0.0003
Ra-228	9.948E-06	0.0043	1.120E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.588E-08	0.0000
Th-228	1.669E-05	0.0072	3.014E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.522E-09	0.0000
Th-230	5.120E-07	0.0002	1.640E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.764E-07	0.0002
Th-232	1.074E-09	0.0000	1.242E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.146E-09	0.0000
U-234	3.489E-08	0.0000	1.429E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.413E-08	0.0000
U-235	6.556E-06	0.0028	1.138E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.947E-09	0.0000
U-238	1.089E-05	0.0047	8.639E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.283E-08	0.0000
Total	2.326E-03	0.9975	2.652E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.172E-06	0.0014

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.005E-06	0.0034
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.584E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.405E-06	0.0015
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.273E-03	0.9749
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.965E-06	0.0043
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.673E-05	0.0072
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.528E-06	0.0011
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.564E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.573E-06	0.0028
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.104E-05	0.0047
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.332E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	7.878E-06	0.0034	1.065E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.915E-08	0.0000
Pb-210	7.178E-07	0.0003	2.112E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.329E-06	0.0006
Ra-226	2.246E-03	0.9631	4.053E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-06	0.0005
Ra-228	2.192E-06	0.0009	2.563E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.768E-09	0.0000
Th-228	2.096E-06	0.0009	3.785E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.934E-10	0.0000
Th-230	2.758E-05	0.0118	1.644E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.894E-07	0.0002
Th-232	2.235E-05	0.0096	3.733E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.108E-08	0.0000
U-234	3.534E-08	0.0000	1.429E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.414E-08	0.0000
U-235	6.557E-06	0.0028	1.141E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.953E-09	0.0000
U-238	1.089E-05	0.0047	8.639E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.283E-08	0.0000
Total	2.326E-03	0.9975	2.652E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.172E-06	0.0014

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.004E-06	0.0034
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.258E-06	0.0010
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.247E-03	0.9638
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.197E-06	0.0009
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.101E-06	0.0009
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.961E-05	0.0127
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.241E-05	0.0096
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.424E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.574E-06	0.0028
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.104E-05	0.0047
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.332E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.866E-02	0.000E+00	0.000E+00	0.000E+00	9.280E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.280E-01
Pa-231	9.588E-07	0.000E+00	0.000E+00	0.000E+00	3.105E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.105E-05
Pb-210	9.023E-01	0.000E+00	0.000E+00	0.000E+00	2.922E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.922E+01
Ra-226	1.037E+00	0.000E+00	0.000E+00	0.000E+00	3.357E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.357E+01
Ra-228	3.297E-03	0.000E+00	0.000E+00	0.000E+00	1.068E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.068E-01
Th-228	7.528E-03	0.000E+00	0.000E+00	0.000E+00	2.438E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.438E-01
Th-230	2.302E+00	0.000E+00	0.000E+00	0.000E+00	7.456E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.456E+01
Th-232	1.148E-02	0.000E+00	0.000E+00	0.000E+00	3.717E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.717E-01
U-234	5.040E-01	0.000E+00	0.000E+00	0.000E+00	1.632E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.632E+01
U-235	4.531E-02	0.000E+00	0.000E+00	0.000E+00	1.467E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.467E+00
U-238	3.716E-01	0.000E+00	0.000E+00	0.000E+00	1.203E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.203E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	7.632E-06	0.0033	1.032E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.855E-08	0.0000
Pa-231	4.764E-10	0.0000	1.466E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.902E-12	0.0000
Pb-210	1.086E-06	0.0005	3.196E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.010E-06	0.0009
Ra-226	2.274E-03	0.9744	3.025E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.166E-07	0.0003
Ra-228	1.033E-05	0.0044	1.163E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.649E-08	0.0000
Th-228	1.688E-05	0.0072	3.048E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.584E-09	0.0000
Th-230	5.120E-07	0.0002	1.640E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.764E-07	0.0002
Th-232	1.074E-09	0.0000	1.242E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.146E-09	0.0000
U-234	3.487E-08	0.0000	1.428E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.410E-08	0.0000
U-235	6.553E-06	0.0028	1.137E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.944E-09	0.0000
U-238	1.088E-05	0.0047	8.635E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.280E-08	0.0000
Total	2.328E-03	0.9975	2.650E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.179E-06	0.0014

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.754E-06	0.0033
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.949E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.416E-06	0.0015
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.275E-03	0.9748
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.035E-05	0.0044
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.692E-05	0.0073
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.528E-06	0.0011
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.564E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.418E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.570E-06	0.0028
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.103E-05	0.0047
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.333E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

(Column group heading: Radionuclides)

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	7.631E-06	0.0033	1.032E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.854E-08	0.0000
Pb-210	6.956E-07	0.0003	2.047E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.288E-06	0.0006
Ra-226	2.245E-03	0.9620	4.125E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.325E-06	0.0006
Ra-228	2.083E-06	0.0009	2.525E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.613E-09	0.0000
Th-228	1.459E-06	0.0006	2.634E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.826E-10	0.0000
Th-230	2.974E-05	0.0127	1.645E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.906E-07	0.0002
Th-232	2.367E-05	0.0101	3.890E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.212E-08	0.0000
U-234	3.538E-08	0.0000	1.429E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.411E-08	0.0000
U-235	6.554E-06	0.0028	1.140E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.951E-09	0.0000
U-238	1.088E-05	0.0047	8.635E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.280E-08	0.0000
Total	2.328E-03	0.9975	2.650E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.179E-06	0.0014

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.

Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.753E-06	0.0033
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.188E-06	0.0009
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.247E-03	0.9628
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.088E-06	0.0009
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.462E-06	0.0006
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.177E-05	0.0136
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.373E-05	0.0102
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.423E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.572E-06	0.0028
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.103E-05	0.0047
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.333E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					
Radio-Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	2.689E-02	0.000E+00	0.000E+00	0.000E+00	8.707E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.707E-01
Pa-231	2.875E-06	0.000E+00	0.000E+00	0.000E+00	9.310E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.310E-05
Pb-210	9.099E-01	0.000E+00	0.000E+00	0.000E+00	2.947E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.947E+01
Ra-226	1.038E+00	0.000E+00	0.000E+00	0.000E+00	3.360E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.360E+01
Ra-228	5.050E-03	0.000E+00	0.000E+00	0.000E+00	1.635E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.635E-01
Th-228	5.870E-03	0.000E+00	0.000E+00	0.000E+00	1.901E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.901E-01
Th-230	2.302E+00	0.000E+00	0.000E+00	0.000E+00	7.455E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.455E+01
Th-232	1.148E-02	0.000E+00	0.000E+00	0.000E+00	3.717E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.717E-01
U-234	5.036E-01	0.000E+00	0.000E+00	0.000E+00	1.631E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.631E+01
U-235	4.526E-02	0.000E+00	0.000E+00	0.000E+00	1.466E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.466E+00
U-238	3.712E-01	0.000E+00	0.000E+00	0.000E+00	1.202E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.202E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

	Radionuclides							
Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	7.161E-06	0.0031	9.682E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-08	0.0000
Pa-231	5.467E-10	0.0000	1.682E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.478E-12	0.0000
Pb-210	1.092E-06	0.0005	3.215E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.022E-06	0.0009
Ra-226	2.276E-03	0.9741	3.028E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.172E-07	0.0003
Ra-228	1.097E-05	0.0047	1.235E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.751E-08	0.0000
Th-228	1.758E-05	0.0075	3.175E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.816E-09	0.0000
Th-230	5.119E-07	0.0002	1.640E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.763E-07	0.0002
Th-232	1.074E-09	0.0000	1.242E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.146E-09	0.0000
U-234	3.484E-08	0.0000	1.427E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.404E-08	0.0000
U-235	6.546E-06	0.0028	1.136E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.938E-09	0.0000
U-238	1.087E-05	0.0047	8.627E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.274E-08	0.0000
Total	2.331E-03	0.9975	2.646E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.191E-06	0.0014

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.275E-06	0.0031
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.680E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.436E-06	0.0015
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.277E-03	0.9745
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.099E-05	0.0047

Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.762E-05	0.0075		
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.528E-06	0.0011		
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.564E-08	0.0000		
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.416E-07	0.0001		
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.564E-06	0.0028		
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.102E-05	0.0047		
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.337E-03	1.0000		

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
	Radionuclides							
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	7.159E-06	0.0031	9.680E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-08	0.0000
Pb-210	6.533E-07	0.0003	1.922E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.209E-06	0.0005
Ra-226	2.243E-03	0.9599	4.264E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.413E-06	0.0006
Ra-228	1.792E-06	0.0008	2.263E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.319E-09	0.0000
Th-228	7.069E-07	0.0003	1.276E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.338E-10	0.0000
Th-230	3.406E-05	0.0146	1.645E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.933E-07	0.0002
Th-232	2.606E-05	0.0112	4.186E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.392E-08	0.0000
U-234	3.547E-08	0.0000	1.427E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.405E-08	0.0000
U-235	6.548E-06	0.0028	1.140E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.946E-09	0.0000
U-238	1.087E-05	0.0047	8.627E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.275E-08	0.0000
Total	2.331E-03	0.9975	2.646E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.191E-06	0.0014

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.273E-06	0.0031
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.055E-06	0.0009
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.245E-03	0.9607
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.795E-06	0.0008
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.084E-07	0.0003
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.609E-05	0.0154
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.613E-05	0.0112
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.423E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.566E-06	0.0028
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.102E-05	0.0047
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.337E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	2.151E-02	0.000E+00	0.000E+00	0.000E+00	6.965E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.965E-01
Pa-231	9.564E-06	0.000E+00	0.000E+00	0.000E+00	3.097E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.097E-04
Pb-210	9.336E-01	0.000E+00	0.000E+00	0.000E+00	3.023E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.023E+01
Ra-226	1.041E+00	0.000E+00	0.000E+00	0.000E+00	3.372E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.372E+01
Ra-228	8.712E-03	0.000E+00	0.000E+00	0.000E+00	2.821E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.821E-01
Th-228	7.653E-03	0.000E+00	0.000E+00	0.000E+00	2.478E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.478E-01
Th-230	2.302E+00	0.000E+00	0.000E+00	0.000E+00	7.454E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.454E+01

Th-232	1.148E-02	0.000E+00	0.000E+00	0.000E+00	3.716E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.716E-01
U-234	5.019E-01	0.000E+00	0.000E+00	0.000E+00	1.625E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.625E+01
U-235	4.512E-02	0.000E+00	0.000E+00	0.000E+00	1.461E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.461E+00
U-238	3.700E-01	0.000E+00	0.000E+00	0.000E+00	1.198E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.198E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	5.729E-06	0.0024	7.746E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.392E-08	0.0000
Pa-231	7.923E-10	0.0000	2.438E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.489E-12	0.0000
Pb-210	1.113E-06	0.0005	3.274E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.060E-06	0.0009
Ra-226	2.284E-03	0.9731	3.039E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.194E-07	0.0003
Ra-228	1.231E-05	0.0052	1.386E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.965E-08	0.0000
Th-228	2.020E-05	0.0086	3.647E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.681E-09	0.0000
Th-230	5.118E-07	0.0002	1.639E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.762E-07	0.0002
Th-232	1.074E-09	0.0000	1.242E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.146E-09	0.0000
U-234	3.472E-08	0.0000	1.422E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.383E-08	0.0000
U-235	6.525E-06	0.0028	1.133E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.919E-09	0.0000
U-238	1.084E-05	0.0046	8.598E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.254E-08	0.0000
Total	2.341E-03	0.9975	2.638E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.230E-06	0.0014

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.820E-06	0.0025
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.232E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.500E-06	0.0015
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.285E-03	0.9735
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.234E-05	0.0053
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.024E-05	0.0086
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.527E-06	0.0011
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.564E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.408E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.542E-06	0.0028
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.099E-05	0.0047
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.347E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Ground Inhalation Radon Plant Meat Milk Soil

Radio-

Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.726E-06	0.0024	7.743E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.392E-08	0.0000
Pb-210	5.244E-07	0.0002	1.543E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.708E-07	0.0004
Ra-226	2.236E-03	0.9526	4.683E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.681E-06	0.0007
Ra-228	8.576E-07	0.0004	1.130E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.959E-10	0.0000
Th-228	5.595E-08	0.0000	1.010E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.851E-11	0.0000
Th-230	4.914E-05	0.0209	1.648E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.036E-07	0.0002
Th-232	3.160E-05	0.0135	4.904E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.787E-08	0.0000
U-234	3.593E-08	0.0000	1.423E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.384E-08	0.0000
U-235	6.528E-06	0.0028	1.138E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.932E-09	0.0000
U-238	1.084E-05	0.0046	8.599E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.254E-08	0.0000
Total	2.341E-03	0.9975	2.638E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.230E-06	0.0014

1RESRAD, Version 6.2 T« Limit = 0.5 year 06/30/2002 14:27 Page 19
Intrisk : Painesville EU 6 - Industrial 2002 File: Pnveu6i2002.rad

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.818E-06	0.0025
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.650E-06	0.0007
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.238E-03	0.9536
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.593E-07	0.0004
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.607E-08	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.119E-05	0.0218
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.168E-05	0.0135
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.421E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.546E-06	0.0028
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.099E-05	0.0047
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.347E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

1RESRAD, Version 6.2 T« Limit = 0.5 year 06/30/2002 14:27 Page 20
Intrisk : Painesville EU 6 - Industrial 2002 File: Pnveu6i2002.rad

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.137E-02	0.000E+00	0.000E+00	0.000E+00	3.683E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.683E-01
Pa-231	2.854E-05	0.000E+00	0.000E+00	0.000E+00	9.241E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.241E-04
Pb-210	9.819E-01	0.000E+00	0.000E+00	0.000E+00	3.180E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.180E+01
Ra-226	1.052E+00	0.000E+00	0.000E+00	0.000E+00	3.406E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.406E+01
Ra-228	1.122E-02	0.000E+00	0.000E+00	0.000E+00	3.634E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.634E-01
Th-228	1.110E-02	0.000E+00	0.000E+00	0.000E+00	3.594E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.594E-01
Th-230	2.300E+00	0.000E+00	0.000E+00	0.000E+00	7.448E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.448E+01
Th-232	1.147E-02	0.000E+00	0.000E+00	0.000E+00	3.714E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.714E-01
U-234	4.973E-01	0.000E+00	0.000E+00	0.000E+00	1.610E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.610E+01
U-235	4.470E-02	0.000E+00	0.000E+00	0.000E+00	1.447E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.447E+00
U-238	3.666E-01	0.000E+00	0.000E+00	0.000E+00	1.187E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.187E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

1RESRAD, Version 6.2 T« Limit = 0.5 year 06/30/2002 14:27 Page 21
Intrisk : Painesville EU 6 - Industrial 2002 File: Pnveu6i2002.rad

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.032E-06	0.0013	4.100E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.370E-09	0.0000
Pa-231	1.489E-09	0.0000	4.581E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.219E-11	0.0000
Pb-210	1.155E-06	0.0005	3.398E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.138E-06	0.0009

Ra-226	2.307E-03	0.9732	3.069E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.255E-07	0.0003
Ra-228	1.323E-05	0.0056	1.489E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.111E-08	0.0000
Th-228	2.247E-05	0.0095	4.058E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.434E-09	0.0000
Th-230	5.114E-07	0.0002	1.638E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.760E-07	0.0002
Th-232	1.073E-09	0.0000	1.241E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.144E-09	0.0000
U-234	3.440E-08	0.0000	1.409E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.324E-08	0.0000
U-235	6.464E-06	0.0027	1.122E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.864E-09	0.0000
U-238	1.074E-05	0.0045	8.519E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.196E-08	0.0000
Total	2.364E-03	0.9975	2.618E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.308E-06	0.0014

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

	Water		Fish		Plant		Meat		Milk		All Pathways**	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.081E-06	0.0013
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.547E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.633E-06	0.0015
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.308E-03	0.9736
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.325E-05	0.0056
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.252E-05	0.0095
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.525E-06	0.0011
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.563E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.385E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.482E-06	0.0027
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.088E-05	0.0046
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.370E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.025E-06	0.0013	4.091E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.352E-09	0.0000
Pb-210	2.800E-07	0.0001	8.239E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.183E-07	0.0002
Ra-226	2.216E-03	0.9350	5.458E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.180E-06	0.0009
Ra-228	7.867E-08	0.0000	1.046E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.403E-11	0.0000
Th-228	3.986E-11	0.0000	7.196E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.318E-14	0.0000
Th-230	9.194E-05	0.0388	1.656E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.410E-07	0.0002
Th-232	3.563E-05	0.0150	5.437E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.064E-08	0.0000
U-234	3.837E-08	0.0000	1.410E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.326E-08	0.0000
U-235	6.473E-06	0.0027	1.136E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.894E-09	0.0000
U-238	1.074E-05	0.0045	8.520E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.196E-08	0.0000
Total	2.364E-03	0.9975	2.618E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.308E-06	0.0014

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.074E-06	0.0013
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.806E-07	0.0004
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.219E-03	0.9361
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.883E-08	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.995E-11	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.404E-05	0.0397
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.571E-05	0.0151

U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.426E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.490E-06	0.0027
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.088E-05	0.0046
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Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.370E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.283E-03	0.000E+00	0.000E+00	0.000E+00	4.156E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.156E-02
Pa-231	9.332E-05	0.000E+00	0.000E+00	0.000E+00	3.022E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.022E-03
Pb-210	1.057E+00	0.000E+00	0.000E+00	0.000E+00	3.421E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.421E+01
Ra-226	1.088E+00	0.000E+00	0.000E+00	0.000E+00	3.523E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.523E+01
Ra-228	1.145E-02	0.000E+00	0.000E+00	0.000E+00	3.707E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.707E-01
Th-228	1.145E-02	0.000E+00	0.000E+00	0.000E+00	3.707E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.707E-01
Th-230	2.294E+00	0.000E+00	0.000E+00	0.000E+00	7.430E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.430E+01
Th-232	1.145E-02	0.000E+00	0.000E+00	0.000E+00	3.707E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.707E-01
U-234	4.812E-01	0.000E+00	0.000E+00	0.000E+00	1.558E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.558E+01
U-235	4.326E-02	0.000E+00	0.000E+00	0.000E+00	1.401E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+00
U-238	3.548E-01	0.000E+00	0.000E+00	0.000E+00	1.149E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.149E+01
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* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
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Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	3.538E-07	0.0001	4.784E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.599E-10	0.0000
Pa-231	3.867E-09	0.0000	1.190E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.167E-11	0.0000
Pb-210	1.227E-06	0.0005	3.611E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.271E-06	0.0009
Ra-226	2.384E-03	0.9751	3.173E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.466E-07	0.0003
Ra-228	1.329E-05	0.0054	1.496E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.122E-08	0.0000
Th-228	2.266E-05	0.0093	4.091E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.496E-09	0.0000
Th-230	5.102E-07	0.0002	1.634E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.750E-07	0.0002
Th-232	1.071E-09	0.0000	1.239E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.140E-09	0.0000
U-234	3.329E-08	0.0000	1.364E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.120E-08	0.0000
U-235	6.257E-06	0.0026	1.086E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.676E-09	0.0000
U-238	1.039E-05	0.0042	8.245E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.997E-08	0.0000
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Total	2.439E-03	0.9975	2.602E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.452E-06	0.0014

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.595E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.018E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.859E-06	0.0016
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.385E-03	0.9755
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.332E-05	0.0054
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.271E-05	0.0093
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.519E-06	0.0010
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.560E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.309E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.273E-06	0.0026
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.053E-05	0.0043
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Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.445E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.243E-07	0.0001	4.384E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.880E-10	0.0000
Pb-210	3.113E-08	0.0000	9.160E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.762E-08	0.0000
Ra-226	2.147E-03	0.8783	6.108E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.627E-06	0.0011
Ra-228	1.701E-11	0.0000	2.261E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.168E-14	0.0000
Th-228	3.846E-22	0.0000	6.944E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.272E-25	0.0000
Th-230	2.385E-04	0.0976	1.692E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.077E-07	0.0002
Th-232	3.596E-05	0.0147	5.480E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.085E-08	0.0000
U-234	5.967E-08	0.0000	1.367E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.129E-08	0.0000
U-235	6.290E-06	0.0026	1.138E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.779E-09	0.0000
U-238	1.039E-05	0.0042	8.248E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.998E-08	0.0000
Total	2.439E-03	0.9975	2.602E-06	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.452E-06	0.0014

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Radio-Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.294E-07	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.791E-08	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.151E-03	0.8796
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.704E-11	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.855E-22	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.408E-04	0.0985
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.604E-05	0.0147
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.576E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.307E-06	0.0026
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.053E-05	0.0043
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.445E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					
Radio-Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	2.408E-04	0.000E+00	0.000E+00	0.000E+00	7.798E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.798E-03
Pa-231	2.651E-04	0.000E+00	0.000E+00	0.000E+00	8.586E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.586E-03
Pb-210	1.158E+00	0.000E+00	0.000E+00	0.000E+00	3.749E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.749E+01
Ra-226	1.183E+00	0.000E+00	0.000E+00	0.000E+00	3.832E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.832E+01
Ra-228	1.138E-02	0.000E+00	0.000E+00	0.000E+00	3.687E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.687E-01
Th-228	1.138E-02	0.000E+00	0.000E+00	0.000E+00	3.687E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.687E-01
Th-230	2.278E+00	0.000E+00	0.000E+00	0.000E+00	7.378E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.378E+01
Th-232	1.138E-02	0.000E+00	0.000E+00	0.000E+00	3.686E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.686E-01
U-234	4.383E-01	0.000E+00	0.000E+00	0.000E+00	1.419E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.419E+01
U-235	3.941E-02	0.000E+00	0.000E+00	0.000E+00	1.276E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.276E+00
U-238	3.232E-01	0.000E+00	0.000E+00	0.000E+00	1.047E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.047E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.677E-08	0.0000	1.308E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.352E-10	0.0000
Pa-231	1.018E-08	0.0000	3.131E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.334E-11	0.0000
Pb-210	1.341E-06	0.0005	3.946E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.482E-06	0.0009
Ra-226	2.591E-03	0.9777	3.448E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.027E-07	0.0003
Ra-228	1.322E-05	0.0050	1.488E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.110E-08	0.0000
Th-228	2.253E-05	0.0085	4.068E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.453E-09	0.0000
Th-230	5.066E-07	0.0002	1.622E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.724E-07	0.0001
Th-232	1.065E-09	0.0000	1.232E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.128E-09	0.0000
U-234	3.032E-08	0.0000	1.242E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.574E-08	0.0000
U-235	5.699E-06	0.0022	9.892E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.170E-09	0.0000
U-238	9.465E-06	0.0036	7.510E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.462E-08	0.0000
Total	2.644E-03	0.9976	2.627E-06	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.704E-06	0.0014

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.831E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.057E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.218E-06	0.0016
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.592E-03	0.9780
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.324E-05	0.0050
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.258E-05	0.0085
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.501E-06	0.0009
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.551E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.102E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.714E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.595E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.650E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	5.493E-10	0.0000	7.427E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.335E-12	0.0000
Pb-210	5.855E-11	0.0000	1.723E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.084E-10	0.0000
Ra-226	1.962E-03	0.7403	5.678E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.462E-06	0.0009
Ra-228	5.735E-22	0.0000	7.623E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.938E-25	0.0000

Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	6.306E-04	0.2379	1.793E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-06	0.0004
Th-232	3.575E-05	0.0135	5.449E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.068E-08	0.0000
U-234	2.203E-07	0.0001	1.251E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.612E-08	0.0000
U-235	5.806E-06	0.0022	1.151E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.487E-09	0.0000
U-238	9.465E-06	0.0036	7.518E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.466E-08	0.0000
Total	2.644E-03	0.9976	2.627E-06	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.704E-06	0.0014

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.581E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.842E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.965E-03	0.7415
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.746E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.335E-04	0.2390
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.584E-05	0.0135
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.015E-07	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.823E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.595E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.650E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	7.148E-04	0.000E+00	0.000E+00	0.000E+00	2.315E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.315E-02
Pa-231	7.336E-04	0.000E+00	0.000E+00	0.000E+00	2.376E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.376E-02
Pb-210	1.424E+00	0.000E+00	0.000E+00	0.000E+00	4.611E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.611E+01
Ra-226	1.448E+00	0.000E+00	0.000E+00	0.000E+00	4.688E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.688E+01
Ra-228	1.116E-02	0.000E+00	0.000E+00	0.000E+00	3.615E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.615E-01
Th-228	1.116E-02	0.000E+00	0.000E+00	0.000E+00	3.615E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.615E-01
Th-230	2.222E+00	0.000E+00	0.000E+00	0.000E+00	7.196E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.196E+01
Th-232	1.116E-02	0.000E+00	0.000E+00	0.000E+00	3.614E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.614E-01
U-234	3.160E-01	0.000E+00	0.000E+00	0.000E+00	1.023E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.023E+01
U-235	2.842E-02	0.000E+00	0.000E+00	0.000E+00	9.205E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.205E-01
U-238	2.331E-01	0.000E+00	0.000E+00	0.000E+00	7.549E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.549E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.789E-07	0.0001	3.770E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.777E-10	0.0000
Pa-231	2.737E-08	0.0000	8.421E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.242E-10	0.0000
Pb-210	1.646E-06	0.0005	4.844E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.047E-06	0.0009
Ra-226	3.163E-03	0.9827	4.209E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.578E-07	0.0003
Ra-228	1.296E-05	0.0040	1.459E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.069E-08	0.0000
Th-228	2.209E-05	0.0069	3.989E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.308E-09	0.0000
Th-230	4.941E-07	0.0002	1.582E-06	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.632E-07	0.0001
Th-232	1.044E-09	0.0000	1.208E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.086E-09	0.0000
U-234	2.186E-08	0.0000	8.953E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.019E-08	0.0000
U-235	4.111E-06	0.0013	7.135E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.729E-09	0.0000
U-238	6.827E-06	0.0021	5.417E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.940E-08	0.0000
Total	3.212E-03	0.9978	2.697E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.382E-06	0.0014

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.833E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.843E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.178E-06	0.0016
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.164E-03	0.9831
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.298E-05	0.0040
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.214E-05	0.0069
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.440E-06	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.521E-08	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.516E-07	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.122E-06	0.0013
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.921E-06	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.219E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.099E-19	0.0000	1.486E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.671E-22	0.0000
Pb-210	1.690E-20	0.0000	4.973E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.128E-20	0.0000
Ra-226	1.431E-03	0.4445	4.140E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.795E-06	0.0006
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.733E-03	0.5384	2.071E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.470E-06	0.0008
Th-232	3.506E-05	0.0109	5.343E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.008E-08	0.0000
U-234	1.622E-06	0.0005	9.235E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.259E-08	0.0000
U-235	4.417E-06	0.0014	1.175E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.631E-09	0.0000
U-238	6.828E-06	0.0021	5.436E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.949E-08	0.0000
Total	3.212E-03	0.9978	2.697E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.382E-06	0.0014

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.117E-19	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.316E-20	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.433E-03	0.4452
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.737E-03	0.5398
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.514E-05	0.0109
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.757E-06	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.434E-06	0.0014
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.922E-06	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.219E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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1RESRAD, Version 6.2      T« Limit = 0.5 year        07/02/2002  13:32  Page   1
 Intrisk : Painesville EU 7 - Industrial 2002              File: Pnveu7i2002.rad

                       Table of Contents
                       ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    Part III: Intake Quantities and Health Risk Factors
    ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ

 Cancer Risk Slope Factors ..............................    2
 Amount of Intake Quantities and Excess Cancer Risks
      Time= 0.000E+00 ...................................    3
      Time= 1.000E+00 ...................................    6
      Time= 3.000E+00 ...................................    9
      Time= 1.000E+01 ...................................   12
      Time= 3.000E+01 ...................................   15
      Time= 1.000E+02 ...................................   18
      Time= 3.000E+02 ...................................   21
      Time= 1.000E+03 ...................................   24
1RESRAD, Version 6.2      T« Limit = 0.5 year        07/02/2002  13:32  Page   2
 Intrisk : Painesville EU 7 - Industrial 2002              File: Pnveu7i2002.rad

                                   Cancer Risk Slope Factors Summary Table
                                     Risk Library: HEAST 2001 Morbidity
0      ³                                                          ³  Current  ³           ³  Parameter
  Menu ³                       Parameter                          ³   Value   ³  Default  ³    Name
 ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Sf-1  ³ Ground external radiation slope factors, 1/yr per (pCi/g): ³           ³           ³
 Sf-1  ³ Pb-210+D                                                 ³ 4.25E-09  ³ 4.25E-09  ³ SLPF( 1,1)
 Sf-1  ³ Ra-226+D                                                 ³ 8.49E-06  ³ 8.49E-06  ³ SLPF( 2,1)
       ³                                                          ³           ³           ³
 Sf-2  ³ Inhalation, slope factors, 1/(pCi):                      ³           ³           ³
 Sf-2  ³ Pb-210+D                                                 ³ 1.36E-08  ³ 1.36E-08  ³ SLPF( 1,2)
 Sf-2  ³ Ra-226+D                                                 ³ 1.16E-08  ³ 1.16E-08  ³ SLPF( 2,2)
       ³                                                          ³           ³           ³
 Sf-3  ³ Food ingestion, slope factors, 1/(pCi):                  ³           ³           ³
 Sf-3  ³ Pb-210+D                                                 ³ 3.44E-09  ³ 3.44E-09  ³ SLPF( 1,3)
 Sf-3  ³ Ra-226+D                                                 ³ 5.15E-10  ³ 5.15E-10  ³ SLPF( 2,3)
       ³                                                          ³           ³           ³
 Sf-3  ³ Water ingestion, slope factors, 1/(pCi):                 ³           ³           ³
 Sf-3  ³ Pb-210+D                                                 ³ 1.26E-09  ³ 1.26E-09  ³ SLPF( 1,4)
 Sf-3  ³ Ra-226+D                                                 ³ 3.86E-10  ³ 3.86E-10  ³ SLPF( 2,4)
       ³                                                          ³           ³           ³
 Sf-3  ³ Soil ingestion, slope factors, 1/(pCi):                  ³           ³           ³
 Sf-3  ³ Pb-210+D                                                 ³ 2.64E-09  ³ 2.64E-09  ³ SLPF( 1,5)
 Sf-3  ³ Ra-226+D                                                 ³ 7.30E-10  ³ 7.30E-10  ³ SLPF( 2,5)
       ³                                                          ³           ³           ³
 Sf-Rn ³ Radon Inhalation slope factors, 1/(pCi):                 ³           ³           ³
 Sf-Rn ³ Rn-222                                                   ³ 1.80E-12  ³ 1.80E-12  ³ SLPFRN(1,1)
 Sf-Rn ³ Po-218                                                   ³ 3.70E-12  ³ 3.70E-12  ³ SLPFRN(1,2)
 Sf-Rn ³ Pb-214                                                   ³ 6.20E-12  ³ 6.20E-12  ³ SLPFRN(1,3)
 Sf-Rn ³ Bi-214                                                   ³ 1.50E-11  ³ 1.50E-11  ³ SLPFRN(1,4)
 Sf-Rn ³ Radon K factors, (mrem/WLM):                             ³           ³           ³
 Sf-Rn ³ Rn-222 Indoor                                            ³ 7.60E+02  ³ 7.60E+02  ³ KFACTR(1,1)
 Sf-Rn ³ Rn-222 Outdoor                                           ³ 5.70E+02  ³ 5.70E+02  ³ KFACTR(1,2)
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                       Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
                                                    As pCi/yr at t= 0.000E+00 years

           Water Independent Pathways (Inhalation w/o radon)                     Water Dependent Pathways
 Radio-   ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ   Total
 Nuclide  Inhalation  Plant       Meat        Milk        Soil        Water       Fish        Plant       Meat        Milk     Ingestion*
 ÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
 Pb-210    1.892E-02  0.000E+00  0.000E+00  0.000E+00  5.985E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  5.985E+00
 Ra-226    1.892E-02  0.000E+00  0.000E+00  0.000E+00  5.985E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  5.985E+00
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 * Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
   and water-dependent water, fish, plant, meat, milk pathways
0
          Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
                     Radon and its Decay Products as pCi/yr at t= 0.000E+00 years
0                                                    Radionuclides
   Radon     ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
   Pathway     Rn-222     Po-218     Pb-214     Bi-214     Rn-220     Po-216     Pb-212     Bi-212
 ÄÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
  Water-ind.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
  Water-dep.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
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  Total       0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00

  Water-ind. == Water-independent    Water-dep. == Water-dependent
0
                  Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
                                   and Fraction of Total Risk at t= 0.000E+00 years
0                                       Water Independent Pathways (Inhalation excludes radon)
0             Ground           Inhalation           Plant              Meat               Milk               Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide    risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.
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ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
Pb-210  1.871E-08 0.0005  6.270E-09 0.0002  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  3.853E-07 0.0106
Ra-226  3.587E-05 0.9857  5.301E-09 0.0001  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.055E-07 0.0029
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Total   3.589E-05 0.9862  1.157E-08 0.0003  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  4.908E-07 0.0135
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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.103E-07	0.0113
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.598E-05	0.9887
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.639E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.308E-08	0.0004	4.384E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.694E-07	0.0074
Ra-226	3.588E-05	0.9858	7.188E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.215E-07	0.0061
Total	3.589E-05	0.9862	1.157E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.908E-07	0.0135

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.869E-07	0.0079
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.611E-05	0.9921
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.639E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					
Radio- Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	1.889E-02	0.000E+00	0.000E+00	0.000E+00	5.975E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.975E+00
Ra-226	1.887E-02	0.000E+00	0.000E+00	0.000E+00	5.968E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.968E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

(Radionuclides)

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.867E-08	0.0005	6.258E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.845E-07	0.0106
Ra-226	3.577E-05	0.9857	5.287E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.052E-07	0.0029
Total	3.579E-05	0.9862	1.154E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.898E-07	0.0135

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.095E-07	0.0113
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.588E-05	0.9887
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.629E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

(Radionuclides)

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.266E-08	0.0003	4.243E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.607E-07	0.0072
Ra-226	3.578E-05	0.9858	7.302E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.291E-07	0.0063
Total	3.579E-05	0.9862	1.154E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.898E-07	0.0135

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.776E-07	0.0076
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.602E-05	0.9924
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.629E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	1.882E-02	0.000E+00	0.000E+00	0.000E+00	5.955E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.955E+00
Ra-226	1.876E-02	0.000E+00	0.000E+00	0.000E+00	5.935E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.935E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.860E-08	0.0005	6.233E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.830E-07	0.0106
Ra-226	3.558E-05	0.9857	5.258E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.047E-07	0.0029
Total	3.559E-05	0.9862	1.149E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.877E-07	0.0135

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.078E-07	0.0113
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.569E-05	0.9887
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.609E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil

Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.186E-08	0.0003	3.974E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.442E-07	0.0068
Ra-226	3.558E-05	0.9858	7.516E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.435E-07	0.0067
Total	3.559E-05	0.9862	1.149E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.877E-07	0.0135

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.600E-07	0.0072
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.583E-05	0.9928
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.609E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	1.858E-02	0.000E+00	0.000E+00	0.000E+00	5.879E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.879E+00
Ra-226	1.840E-02	0.000E+00	0.000E+00	0.000E+00	5.822E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.822E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.832E-08	0.0005	6.141E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.774E-07	0.0107
Ra-226	3.489E-05	0.9856	5.157E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.027E-07	0.0029
Total	3.491E-05	0.9861	1.130E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.800E-07	0.0136

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.018E-07	0.0113
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.500E-05	0.9887
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.540E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	9.431E-09	0.0003	3.161E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.942E-07	0.0055
Ra-226	3.490E-05	0.9859	8.137E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.858E-07	0.0081
Total	3.491E-05	0.9861	1.130E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.800E-07	0.0136

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.068E-07	0.0058
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.520E-05	0.9942
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.540E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	1.780E-02	0.000E+00	0.000E+00	0.000E+00	5.632E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.632E+00
Ra-226	1.741E-02	0.000E+00	0.000E+00	0.000E+00	5.509E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.509E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.749E-08	0.0005	5.862E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.602E-07	0.0108
Ra-226	3.302E-05	0.9855	4.880E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.714E-08	0.0029
Total	3.304E-05	0.9860	1.074E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.574E-07	0.0137

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.

Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.836E-07	0.0114
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.312E-05	0.9886
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.350E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	4.902E-09	0.0001	1.643E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.010E-07	0.0030
Ra-226	3.303E-05	0.9859	9.099E-09	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.564E-07	0.0106
Total	3.304E-05	0.9860	1.074E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.574E-07	0.0137

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.075E-07	0.0032
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.340E-05	0.9968
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.350E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	1.487E-02	0.000E+00	0.000E+00	0.000E+00	4.703E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.703E+00
Ra-226	1.435E-02	0.000E+00	0.000E+00	0.000E+00	4.540E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.540E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.455E-08	0.0005	4.876E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.996E-07	0.0108
Ra-226	2.721E-05	0.9854	4.022E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.006E-08	0.0029

Total	2.723E-05	0.9859	8.898E-09	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.797E-07	0.0137

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.191E-07	0.0116
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.730E-05	0.9884
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.762E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	4.964E-10	0.0000	1.664E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.022E-08	0.0004
Ra-226	2.723E-05	0.9859	8.731E-09	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.695E-07	0.0134
Total	2.723E-05	0.9859	8.898E-09	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.797E-07	0.0137

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.089E-08	0.0004
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.761E-05	0.9996
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.762E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	8.572E-03	0.000E+00	0.000E+00	0.000E+00	2.712E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.712E+00
Ra-226	8.260E-03	0.000E+00	0.000E+00	0.000E+00	2.613E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.613E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	8.384E-09	0.0005	2.810E-09	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.727E-07	0.0109
Ra-226	1.566E-05	0.9854	2.315E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.608E-08	0.0029
Total	1.567E-05	0.9859	5.124E-09	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.187E-07	0.0138

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.839E-07	0.0116
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.571E-05	0.9884
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.589E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	7.150E-13	0.0000	2.396E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.473E-11	0.0000
Ra-226	1.567E-05	0.9859	5.124E-09	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.187E-07	0.0138
Total	1.567E-05	0.9859	5.124E-09	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.187E-07	0.0138

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.568E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.589E-05	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.589E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	1.240E-03	0.000E+00	0.000E+00	0.000E+00	3.921E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.921E-01
Ra-226	1.194E-03	0.000E+00	0.000E+00	0.000E+00	3.778E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.778E-01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.212E-09	0.0005	4.063E-10	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.497E-08	0.0109
Ra-226	2.265E-06	0.9854	3.347E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.663E-09	0.0029
Total	2.266E-06	0.9859	7.410E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.163E-08	0.0138

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.659E-08	0.0116
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.272E-06	0.9884
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.298E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	8.109E-23	0.0000	2.718E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.670E-21	0.0000
Ra-226	2.266E-06	0.9859	7.410E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.163E-08	0.0138
Total	2.266E-06	0.9859	7.410E-10	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.163E-08	0.0138

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.778E-21	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.298E-06	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.298E-06	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	1.934E+00	0.000E+00	0.000E+00	0.000E+00	1.758E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.758E+02
Ra-226	1.934E+00	0.000E+00	0.000E+00	0.000E+00	1.758E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.758E+02
Ra-228	1.551E-03	0.000E+00	0.000E+00	0.000E+00	1.410E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.410E-01
Th-228	1.861E-02	0.000E+00	0.000E+00	0.000E+00	1.692E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.692E+00
Th-230	1.728E+00	0.000E+00	0.000E+00	0.000E+00	1.571E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.571E+02
Th-232	1.112E-01	0.000E+00	0.000E+00	0.000E+00	1.010E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.010E+01
U-234	5.147E-01	0.000E+00	0.000E+00	0.000E+00	4.679E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.679E+01
U-235	3.076E-02	0.000E+00	0.000E+00	0.000E+00	2.796E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.796E+00
U-238	2.872E-01	0.000E+00	0.000E+00	0.000E+00	2.611E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.611E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.427E-09	0.0000	1.923E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.700E-12	0.0000
Pa-231	4.273E-10	0.0000	1.309E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.779E-12	0.0000
Pb-210	2.650E-06	0.0005	7.783E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.374E-05	0.0025
Ra-226	5.072E-03	0.9387	6.721E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.845E-06	0.0007
Ra-228	1.142E-04	0.0211	1.279E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.092E-07	0.0001
Th-228	1.753E-04	0.0324	3.151E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.620E-07	0.0000
Th-230	4.619E-07	0.0001	1.475E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.505E-07	0.0002
Th-232	1.249E-08	0.0000	1.442E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.992E-08	0.0000
U-234	4.206E-08	0.0000	1.719E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.166E-07	0.0000
U-235	5.267E-06	0.0010	9.103E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.335E-08	0.0000
U-238	9.954E-06	0.0018	7.868E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.606E-07	0.0000
Total	5.380E-03	0.9957	3.658E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.967E-05	0.0036

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.456E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.501E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.717E-05	0.0032
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.077E-03	0.9395
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.147E-04	0.0212
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.757E-04	0.0325
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.888E-06	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.266E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.305E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.290E-06	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.019E-05	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.403E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.721E-06	0.0003	5.057E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.928E-06	0.0017
Ra-226	5.044E-03	0.9335	9.398E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.618E-06	0.0016
Ra-228	1.566E-06	0.0003	1.830E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.513E-09	0.0000
Th-228	4.086E-06	0.0008	7.345E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.777E-09	0.0000
Th-230	2.978E-05	0.0055	1.480E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.926E-07	0.0002
Th-232	2.838E-04	0.0525	4.629E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.339E-07	0.0001
U-234	4.285E-08	0.0000	1.720E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.166E-07	0.0000
U-235	5.269E-06	0.0010	9.135E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.337E-08	0.0000
U-238	9.954E-06	0.0018	7.868E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.606E-07	0.0000
Total	5.380E-03	0.9957	3.658E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.967E-05	0.0036

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-05	0.0021
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.053E-03	0.9352
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.571E-06	0.0003
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.097E-06	0.0008
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.225E-05	0.0060
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.850E-04	0.0527
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.314E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.292E-06	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.019E-05	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.403E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.035E-08	0.000E+00	0.000E+00	0.000E+00	9.412E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.412E-07
Pa-231	6.503E-07	0.000E+00	0.000E+00	0.000E+00	5.911E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.911E-05
Pb-210	1.933E+00	0.000E+00	0.000E+00	0.000E+00	1.757E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.757E+02
Ra-226	1.934E+00	0.000E+00	0.000E+00	0.000E+00	1.758E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.758E+02
Ra-228	1.400E-02	0.000E+00	0.000E+00	0.000E+00	1.272E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.272E+00
Th-228	1.547E-02	0.000E+00	0.000E+00	0.000E+00	1.406E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.406E+00
Th-230	1.728E+00	0.000E+00	0.000E+00	0.000E+00	1.571E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.571E+02
Th-232	1.112E-01	0.000E+00	0.000E+00	0.000E+00	1.010E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.010E+01
U-234	5.139E-01	0.000E+00	0.000E+00	0.000E+00	4.671E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.671E+01
U-235	3.071E-02	0.000E+00	0.000E+00	0.000E+00	2.792E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.792E+00
U-238	2.868E-01	0.000E+00	0.000E+00	0.000E+00	2.607E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.607E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.574E-09	0.0000	2.120E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.070E-11	0.0000
Pa-231	4.555E-10	0.0000	1.395E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.042E-11	0.0000
Pb-210	2.648E-06	0.0005	7.778E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.373E-05	0.0025
Ra-226	5.072E-03	0.9367	6.721E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.844E-06	0.0007
Ra-228	1.189E-04	0.0220	1.332E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.301E-07	0.0001
Th-228	1.824E-04	0.0337	3.280E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.687E-07	0.0000
Th-230	4.619E-07	0.0001	1.475E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.504E-07	0.0002
Th-232	1.249E-08	0.0000	1.442E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.992E-08	0.0000
U-234	4.199E-08	0.0000	1.716E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.162E-07	0.0000
U-235	5.259E-06	0.0010	9.089E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.333E-08	0.0000
U-238	9.939E-06	0.0018	7.855E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.604E-07	0.0000
Total	5.391E-03	0.9957	3.670E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.969E-05	0.0036

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.606E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.798E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.716E-05	0.0032
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.076E-03	0.9375
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.194E-04	0.0221
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.829E-04	0.0338
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.887E-06	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.266E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.298E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.281E-06	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.018E-05	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.415E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.667E-06	0.0003	4.897E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.646E-06	0.0016
Ra-226	5.041E-03	0.9311	9.548E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.886E-06	0.0016
Ra-228	1.485E-06	0.0003	1.797E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.203E-09	0.0000
Th-228	2.844E-06	0.0005	5.112E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.629E-09	0.0000
Th-230	3.173E-05	0.0059	1.481E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.959E-07	0.0002
Th-232	2.970E-04	0.0548	4.786E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.628E-07	0.0001
U-234	4.287E-08	0.0000	1.717E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.163E-07	0.0000
U-235	5.261E-06	0.0010	9.124E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.335E-08	0.0000
U-238	9.939E-06	0.0018	7.856E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.604E-07	0.0000
Total	5.391E-03	0.9957	3.670E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.969E-05	0.0036

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.080E-05	0.0020
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.051E-03	0.9329
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.490E-06	0.0003
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.852E-06	0.0005
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.421E-05	0.0063
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.982E-04	0.0551
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.308E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.283E-06	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.018E-05	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.415E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	9.308E-08	0.000E+00	0.000E+00	0.000E+00	8.461E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.461E-06
Pa-231	1.947E-06	0.000E+00	0.000E+00	0.000E+00	1.770E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.770E-04
Pb-210	1.929E+00	0.000E+00	0.000E+00	0.000E+00	1.753E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.753E+02
Ra-226	1.934E+00	0.000E+00	0.000E+00	0.000E+00	1.758E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.758E+02
Ra-228	3.481E-02	0.000E+00	0.000E+00	0.000E+00	3.164E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.164E+00
Th-228	2.093E-02	0.000E+00	0.000E+00	0.000E+00	1.902E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.902E+00
Th-230	1.728E+00	0.000E+00	0.000E+00	0.000E+00	1.570E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.570E+02
Th-232	1.111E-01	0.000E+00	0.000E+00	0.000E+00	1.010E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.010E+01
U-234	5.123E-01	0.000E+00	0.000E+00	0.000E+00	4.656E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.656E+01
U-235	3.062E-02	0.000E+00	0.000E+00	0.000E+00	2.783E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.783E+00
U-238	2.859E-01	0.000E+00	0.000E+00	0.000E+00	2.598E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.598E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.895E-09	0.0000	2.554E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.288E-11	0.0000
Pa-231	5.117E-10	0.0000	1.568E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.171E-11	0.0000
Pb-210	2.644E-06	0.0005	7.768E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-05	0.0025
Ra-226	5.070E-03	0.9328	6.719E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.843E-06	0.0007
Ra-228	1.267E-04	0.0233	1.419E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.649E-07	0.0001
Th-228	1.968E-04	0.0362	3.537E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.819E-07	0.0000
Th-230	4.618E-07	0.0001	1.475E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.502E-07	0.0002
Th-232	1.249E-08	0.0000	1.442E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.990E-08	0.0000
U-234	4.186E-08	0.0000	1.711E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.155E-07	0.0000
U-235	5.242E-06	0.0010	9.060E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.329E-08	0.0000
U-238	9.907E-06	0.0018	7.830E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.599E-07	0.0000
Total	5.412E-03	0.9957	3.694E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.972E-05	0.0036

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.934E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.391E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.714E-05	0.0032
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.075E-03	0.9337
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.272E-04	0.0234
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.973E-04	0.0363
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.887E-06	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.265E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.285E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.265E-06	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.015E-05	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.436E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.563E-06	0.0003	4.592E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.109E-06	0.0015
Ra-226	5.036E-03	0.9266	9.833E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.398E-06	0.0017
Ra-228	1.274E-06	0.0002	1.604E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.616E-09	0.0000
Th-228	1.378E-06	0.0003	2.476E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.273E-09	0.0000
Th-230	3.562E-05	0.0066	1.481E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.003E-06	0.0002
Th-232	3.208E-04	0.0590	5.080E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.128E-07	0.0001
U-234	4.291E-08	0.0000	1.712E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.156E-07	0.0000
U-235	5.245E-06	0.0010	9.101E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.331E-08	0.0000
U-238	9.907E-06	0.0018	7.831E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.599E-07	0.0000
Total	5.412E-03	0.9957	3.694E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.972E-05	0.0036

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.013E-05	0.0019
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.047E-03	0.9285
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.278E-06	0.0002
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.381E-06	0.0003
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.811E-05	0.0070
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.221E-04	0.0593
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.296E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.267E-06	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.015E-05	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.436E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.030E-06	0.000E+00	0.000E+00	0.000E+00	9.361E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.361E-05
Pa-231	6.450E-06	0.000E+00	0.000E+00	0.000E+00	5.863E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.863E-04
Pb-210	1.917E+00	0.000E+00	0.000E+00	0.000E+00	1.743E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.743E+02
Ra-226	1.932E+00	0.000E+00	0.000E+00	0.000E+00	1.757E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.757E+02
Ra-228	7.826E-02	0.000E+00	0.000E+00	0.000E+00	7.114E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.114E+00
Th-228	6.382E-02	0.000E+00	0.000E+00	0.000E+00	5.801E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.801E+00
Th-230	1.726E+00	0.000E+00	0.000E+00	0.000E+00	1.569E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.569E+02
Th-232	1.111E-01	0.000E+00	0.000E+00	0.000E+00	1.009E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.009E+01
U-234	5.066E-01	0.000E+00	0.000E+00	0.000E+00	4.605E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.605E+01
U-235	3.028E-02	0.000E+00	0.000E+00	0.000E+00	2.752E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.752E+00
U-238	2.827E-01	0.000E+00	0.000E+00	0.000E+00	2.570E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.570E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	3.314E-09	0.0000	4.465E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.253E-11	0.0000
Pa-231	7.070E-10	0.0000	2.166E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.618E-11	0.0000
Pb-210	2.634E-06	0.0005	7.736E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-05	0.0025
Ra-226	5.067E-03	0.9238	6.714E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.841E-06	0.0007
Ra-228	1.430E-04	0.0261	1.602E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.376E-07	0.0001
Th-228	2.336E-04	0.0426	4.199E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.159E-07	0.0000
Th-230	4.614E-07	0.0001	1.474E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.495E-07	0.0002
Th-232	1.248E-08	0.0000	1.441E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.986E-08	0.0000
U-234	4.139E-08	0.0000	1.692E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.132E-07	0.0000
U-235	5.184E-06	0.0009	8.960E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.314E-08	0.0000
U-238	9.798E-06	0.0018	7.744E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.581E-07	0.0000
Total	5.461E-03	0.9957	3.754E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.976E-05	0.0036

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.381E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.448E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.707E-05	0.0031
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.071E-03	0.9246
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.436E-04	0.0262
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.342E-04	0.0427
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.885E-06	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.264E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.237E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.206E-06	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.003E-05	0.0018
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.485E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Pb-210	1.249E-06	0.0002	3.668E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.477E-06	0.0012
Ra-226	5.019E-03	0.9151	1.069E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-05	0.0020
Ra-228	6.079E-07	0.0001	7.980E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.180E-09	0.0000
Th-228	1.090E-07	0.0000	1.959E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.007E-10	0.0000
Th-230	4.921E-05	0.0090	1.483E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.030E-06	0.0002
Th-232	3.758E-04	0.0685	5.790E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.221E-07	0.0002
U-234	4.323E-08	0.0000	1.693E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.132E-07	0.0000
U-235	5.188E-06	0.0009	9.026E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.318E-08	0.0000
U-238	9.798E-06	0.0018	7.744E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.581E-07	0.0000
Total	5.461E-03	0.9957	3.754E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.976E-05	0.0036

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.093E-06	0.0015
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.031E-03	0.9173
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.098E-07	0.0001
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.093E-07	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.172E-05	0.0094
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.773E-04	0.0688
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.257E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.211E-06	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.003E-05	0.0018
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.485E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	9.158E-06	0.000E+00	0.000E+00	0.000E+00	8.324E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.324E-04
Pa-231	1.900E-05	0.000E+00	0.000E+00	0.000E+00	1.727E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.727E-03
Pb-210	1.895E+00	0.000E+00	0.000E+00	0.000E+00	1.722E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.722E+02
Ra-226	1.928E+00	0.000E+00	0.000E+00	0.000E+00	1.753E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.753E+02
Ra-228	1.079E-01	0.000E+00	0.000E+00	0.000E+00	9.811E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.811E+00
Th-228	1.065E-01	0.000E+00	0.000E+00	0.000E+00	9.678E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.678E+00
Th-230	1.723E+00	0.000E+00	0.000E+00	0.000E+00	1.566E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.566E+02
Th-232	1.108E-01	0.000E+00	0.000E+00	0.000E+00	1.008E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.008E+01
U-234	4.908E-01	0.000E+00	0.000E+00	0.000E+00	4.461E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.461E+01
U-235	2.933E-02	0.000E+00	0.000E+00	0.000E+00	2.666E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.666E+00
U-238	2.739E-01	0.000E+00	0.000E+00	0.000E+00	2.489E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.489E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.837E-09	0.0000	1.325E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.686E-11	0.0000
Pa-231	1.251E-09	0.0000	3.833E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.864E-11	0.0000
Pb-210	2.611E-06	0.0005	7.671E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-05	0.0025
Ra-226	5.056E-03	0.9172	6.700E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.832E-06	0.0007
Ra-228	1.539E-04	0.0279	1.725E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.864E-07	0.0001
Th-228	2.614E-04	0.0474	4.699E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.416E-07	0.0000
Th-230	4.605E-07	0.0001	1.471E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.476E-07	0.0002
Th-232	1.246E-08	0.0000	1.438E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.972E-08	0.0000
U-234	4.010E-08	0.0000	1.639E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.065E-07	0.0000
U-235	5.022E-06	0.0009	8.680E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.273E-08	0.0000
U-238	9.492E-06	0.0017	7.502E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.532E-07	0.0000
Total	5.489E-03	0.9957	3.787E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.969E-05	0.0036

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.004E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.318E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.692E-05	0.0031
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.060E-03	0.9180
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.546E-04	0.0281
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.621E-04	0.0475
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.879E-06	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.260E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.105E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.044E-06	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.720E-06	0.0018
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.512E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	6.573E-07	0.0001	1.931E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.409E-06	0.0006
Ra-226	4.970E-03	0.9017	1.226E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.379E-05	0.0025
Ra-228	5.568E-08	0.0000	7.369E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.069E-10	0.0000
Th-228	7.753E-11	0.0000	1.394E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.167E-14	0.0000
Th-230	8.773E-05	0.0159	1.488E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.124E-06	0.0002
Th-232	4.152E-04	0.0753	6.308E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.977E-07	0.0002
U-234	4.550E-08	0.0000	1.641E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.066E-07	0.0000
U-235	5.033E-06	0.0009	8.851E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.283E-08	0.0000
U-238	9.492E-06	0.0017	7.503E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.532E-07	0.0000
Total	5.489E-03	0.9957	3.787E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.969E-05	0.0036

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.259E-06	0.0008
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.985E-03	0.9044
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.586E-08	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.774E-11	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.034E-05	0.0164
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.169E-04	0.0756
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.162E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.055E-06	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.720E-06	0.0018
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.512E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	9.759E-05	0.000E+00	0.000E+00	0.000E+00	8.871E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.871E-03
Pa-231	5.949E-05	0.000E+00	0.000E+00	0.000E+00	5.408E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.408E-03
Pb-210	1.862E+00	0.000E+00	0.000E+00	0.000E+00	1.693E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.693E+02
Ra-226	1.914E+00	0.000E+00	0.000E+00	0.000E+00	1.740E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.740E+02
Ra-228	1.101E-01	0.000E+00	0.000E+00	0.000E+00	1.001E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.001E+01
Th-228	1.101E-01	0.000E+00	0.000E+00	0.000E+00	1.001E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.001E+01
Th-230	1.711E+00	0.000E+00	0.000E+00	0.000E+00	1.555E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.555E+02
Th-232	1.101E-01	0.000E+00	0.000E+00	0.000E+00	1.001E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.001E+01
U-234	4.391E-01	0.000E+00	0.000E+00	0.000E+00	3.992E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.992E+01
U-235	2.625E-02	0.000E+00	0.000E+00	0.000E+00	2.386E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.386E+00
U-238	2.451E-01	0.000E+00	0.000E+00	0.000E+00	2.228E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.228E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	5.984E-08	0.0000	8.060E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.066E-10	0.0000
Pa-231	3.007E-09	0.0000	9.210E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.881E-11	0.0000
Pb-210	2.575E-06	0.0005	7.565E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.336E-05	0.0024
Ra-226	5.018E-03	0.9167	6.650E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.804E-06	0.0007
Ra-228	1.540E-04	0.0281	1.726E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.868E-07	0.0001
Th-228	2.624E-04	0.0479	4.718E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.426E-07	0.0000
Th-230	4.572E-07	0.0001	1.460E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.408E-07	0.0002
Th-232	1.237E-08	0.0000	1.428E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.926E-08	0.0000
U-234	3.588E-08	0.0000	1.467E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.848E-07	0.0000
U-235	4.494E-06	0.0008	7.767E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.139E-08	0.0000
U-238	8.495E-06	0.0016	6.713E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.371E-07	0.0000
Total	5.450E-03	0.9958	3.736E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.943E-05	0.0036

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.105E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.168E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.669E-05	0.0030
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.022E-03	0.9176
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.547E-04	0.0283
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.631E-04	0.0481
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.858E-06	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.245E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.673E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.513E-06	0.0008
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.699E-06	0.0016
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.473E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
	Radionuclides							
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	6.952E-08	0.0000	2.042E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.606E-07	0.0001
Ra-226	4.802E-03	0.8773	1.348E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.621E-05	0.0030
Ra-228	1.200E-11	0.0000	1.588E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.304E-14	0.0000
Th-228	7.444E-22	0.0000	1.339E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.883E-25	0.0000
Th-230	2.189E-04	0.0400	1.513E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.535E-06	0.0003
Th-232	4.164E-04	0.0761	6.319E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.986E-07	0.0002
U-234	6.824E-08	0.0000	1.471E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.851E-07	0.0000
U-235	4.557E-06	0.0008	8.666E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.187E-08	0.0000
U-238	8.495E-06	0.0016	6.716E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.371E-07	0.0000
Total	5.450E-03	0.9958	3.736E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.943E-05	0.0036

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.505E-07	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.819E-03	0.8805
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.204E-11	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.464E-22	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.220E-04	0.0406
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.180E-04	0.0764
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.004E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.578E-06	0.0008
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.699E-06	0.0016
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.473E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	7.820E-04	0.000E+00	0.000E+00	0.000E+00	7.109E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.109E-02
Pa-231	1.498E-04	0.000E+00	0.000E+00	0.000E+00	1.362E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.362E-02
Pb-210	1.821E+00	0.000E+00	0.000E+00	0.000E+00	1.655E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.655E+02
Ra-226	1.873E+00	0.000E+00	0.000E+00	0.000E+00	1.703E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.703E+02
Ra-228	1.080E-01	0.000E+00	0.000E+00	0.000E+00	9.821E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.821E+00
Th-228	1.080E-01	0.000E+00	0.000E+00	0.000E+00	9.821E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.821E+00
Th-230	1.676E+00	0.000E+00	0.000E+00	0.000E+00	1.523E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.523E+02
Th-232	1.080E-01	0.000E+00	0.000E+00	0.000E+00	9.818E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.818E+00
U-234	3.197E-01	0.000E+00	0.000E+00	0.000E+00	2.906E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.906E+01
U-235	1.911E-02	0.000E+00	0.000E+00	0.000E+00	1.737E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.737E+00
U-238	1.784E-01	0.000E+00	0.000E+00	0.000E+00	1.622E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.622E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.983E-07	0.0001	5.363E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.706E-09	0.0000
Pa-231	6.918E-09	0.0000	2.119E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.583E-10	0.0000
Pb-210	2.519E-06	0.0005	7.399E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.307E-05	0.0024
Ra-226	4.910E-03	0.9171	6.509E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.723E-06	0.0007
Ra-228	1.510E-04	0.0282	1.693E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.737E-07	0.0001
Th-228	2.572E-04	0.0480	4.628E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.380E-07	0.0000
Th-230	4.479E-07	0.0001	1.431E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.217E-07	0.0002
Th-232	1.214E-08	0.0000	1.401E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.794E-08	0.0000
U-234	2.612E-08	0.0000	1.068E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.345E-07	0.0000
U-235	3.272E-06	0.0006	5.655E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.296E-09	0.0000
U-238	6.186E-06	0.0012	4.888E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.979E-08	0.0000
Total	5.331E-03	0.9958	3.608E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.894E-05	0.0035

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.063E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.289E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.632E-05	0.0030
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.915E-03	0.9180
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.517E-04	0.0283
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.579E-04	0.0482
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.800E-06	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.202E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.674E-07	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.286E-06	0.0006
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.334E-06	0.0012
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.354E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.134E-10	0.0000	3.331E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.881E-10	0.0000
Ra-226	4.349E-03	0.8122	1.239E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.500E-05	0.0028
Ra-228	4.010E-22	0.0000	5.310E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.702E-25	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	5.644E-04	0.1054	1.581E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.707E-06	0.0005
Th-232	4.083E-04	0.0763	6.199E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.797E-07	0.0002
U-234	2.354E-07	0.0000	1.077E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.357E-07	0.0000
U-235	3.677E-06	0.0007	1.123E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-08	0.0000
U-238	6.186E-06	0.0012	4.893E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.986E-08	0.0000
Total	5.331E-03	0.9958	3.608E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.894E-05	0.0035

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.348E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.365E-03	0.8153
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.023E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.687E-04	0.1062
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.099E-04	0.0766
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.788E-07	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.700E-06	0.0007
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.335E-06	0.0012
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.354E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	5.995E-03	0.000E+00	0.000E+00	0.000E+00	5.449E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.449E-01
Pa-231	2.836E-04	0.000E+00	0.000E+00	0.000E+00	2.578E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.578E-02
Pb-210	1.690E+00	0.000E+00	0.000E+00	0.000E+00	1.536E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.536E+02
Ra-226	1.739E+00	0.000E+00	0.000E+00	0.000E+00	1.581E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.581E+02
Ra-228	1.010E-01	0.000E+00	0.000E+00	0.000E+00	9.184E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.184E+00
Th-228	1.010E-01	0.000E+00	0.000E+00	0.000E+00	9.184E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.184E+00
Th-230	1.558E+00	0.000E+00	0.000E+00	0.000E+00	1.417E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.417E+02
Th-232	1.010E-01	0.000E+00	0.000E+00	0.000E+00	9.182E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.182E+00
U-234	1.052E-01	0.000E+00	0.000E+00	0.000E+00	9.561E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.561E+00
U-235	6.295E-03	0.000E+00	0.000E+00	0.000E+00	5.722E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.722E-01
U-238	5.877E-02	0.000E+00	0.000E+00	0.000E+00	5.342E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.342E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.858E-06	0.0006	3.844E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.939E-08	0.0000
Pa-231	1.268E-08	0.0000	3.884E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.902E-10	0.0000
Pb-210	2.338E-06	0.0005	6.869E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.213E-05	0.0024
Ra-226	4.554E-03	0.9173	6.042E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.456E-06	0.0007
Ra-228	1.412E-04	0.0284	1.583E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.300E-07	0.0001
Th-228	2.399E-04	0.0483	4.328E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.226E-07	0.0000
Th-230	4.166E-07	0.0001	1.330E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.571E-07	0.0002
Th-232	1.135E-08	0.0000	1.310E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.354E-08	0.0000
U-234	8.596E-09	0.0000	3.513E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.426E-08	0.0000
U-235	1.077E-06	0.0002	1.863E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.732E-09	0.0000
U-238	2.038E-06	0.0004	1.610E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.287E-08	0.0000
Total	4.944E-03	0.9958	3.293E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.746E-05	0.0035

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.916E-06	0.0006
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.336E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.515E-05	0.0031
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.558E-03	0.9181
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.418E-04	0.0286
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.405E-04	0.0484
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.604E-06	0.0005
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.059E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.798E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.082E-06	0.0002
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.087E-06	0.0004
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.964E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.987E-20	0.0000	5.837E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.031E-19	0.0000
Ra-226	3.074E-03	0.6192	8.767E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.061E-05	0.0021
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.481E-03	0.2984	1.742E-06	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.821E-06	0.0012
Th-232	3.811E-04	0.0768	5.797E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.162E-07	0.0002
U-234	1.367E-06	0.0003	3.732E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.987E-08	0.0000
U-235	3.948E-06	0.0008	4.069E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.241E-08	0.0000
U-238	2.039E-06	0.0004	1.616E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.294E-08	0.0000
Total	4.944E-03	0.9958	3.293E-06	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.746E-05	0.0035

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.288E-19	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.085E-03	0.6215
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.489E-03	0.2999
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.825E-04	0.0771
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.455E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.011E-06	0.0008
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.088E-06	0.0004
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.964E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Residential RESRAD Runs.

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0

Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.179E-02	0.000E+00	0.000E+00	0.000E+00	8.643E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.643E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	1.022E+00	0.000E+00	0.000E+00	0.000E+00	7.495E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.495E+02
Ra-226	9.668E-01	0.000E+00	0.000E+00	0.000E+00	7.090E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.090E+02
Ra-228	4.420E-03	0.000E+00	0.000E+00	0.000E+00	3.241E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.241E+00
Th-228	2.099E-02	0.000E+00	0.000E+00	0.000E+00	1.540E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.540E+01
Th-230	5.690E-01	0.000E+00	0.000E+00	0.000E+00	4.173E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.173E+02
Th-232	2.062E-02	0.000E+00	0.000E+00	0.000E+00	1.513E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.513E+01
U-234	1.227E+00	0.000E+00	0.000E+00	0.000E+00	8.997E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.997E+02
U-235	2.725E-02	0.000E+00	0.000E+00	0.000E+00	1.999E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.999E+01
U-238	3.797E-01	0.000E+00	0.000E+00	0.000E+00	2.785E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.785E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.868E-06	0.0013	4.757E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.936E-07	0.0001
Pa-231	3.095E-10	0.0000	1.174E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.079E-11	0.0000
Pb-210	1.122E-06	0.0005	4.065E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.792E-05	0.0258
Ra-226	2.091E-03	0.9307	3.355E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.548E-05	0.0069
Ra-228	1.879E-05	0.0084	2.551E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.191E-07	0.0004
Th-228	3.250E-05	0.0145	7.015E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.910E-07	0.0001
Th-230	1.219E-07	0.0001	4.864E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.528E-06	0.0011
Th-232	1.851E-09	0.0000	2.678E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.048E-07	0.0000
U-234	8.103E-08	0.0000	4.166E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.235E-06	0.0019
U-235	3.816E-06	0.0017	8.200E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.706E-08	0.0000
U-238	1.100E-05	0.0049	1.058E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.742E-06	0.0008
Total	2.161E-03	0.9620	1.906E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.341E-05	0.0371

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.109E-06	0.0014
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.921E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.945E-05	0.0265
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.107E-03	0.9378
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.962E-05	0.0087
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.286E-05	0.0146
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.136E-06	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.334E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.732E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.922E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.285E-05	0.0057
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.247E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.867E-06	0.0013	4.756E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.936E-07	0.0001
Pb-210	7.439E-07	0.0003	2.696E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.840E-05	0.0171
Ra-226	2.083E-03	0.9273	4.708E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.488E-05	0.0155
Ra-228	3.705E-06	0.0016	5.217E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.078E-08	0.0000
Th-228	3.838E-06	0.0017	8.285E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.438E-08	0.0000
Th-230	8.105E-06	0.0036	4.879E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.640E-06	0.0012
Th-232	4.375E-05	0.0195	8.598E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.100E-06	0.0005
U-234	8.261E-08	0.0000	4.168E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.235E-06	0.0019
U-235	3.817E-06	0.0017	8.226E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.718E-08	0.0000
U-238	1.100E-05	0.0049	1.058E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.742E-06	0.0008
Total	2.161E-03	0.9620	1.906E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.341E-05	0.0371

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.109E-06	0.0014
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.942E-05	0.0175
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.119E-03	0.9431
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.791E-06	0.0017
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.881E-06	0.0017
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.123E-05	0.0050
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.493E-05	0.0200
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.735E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.923E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.285E-05	0.0057
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.247E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.142E-02	0.000E+00	0.000E+00	0.000E+00	8.372E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.372E+00
Pa-231	5.765E-07	0.000E+00	0.000E+00	0.000E+00	4.228E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.228E-04
Pb-210	1.020E+00	0.000E+00	0.000E+00	0.000E+00	7.481E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.481E+02
Ra-226	9.666E-01	0.000E+00	0.000E+00	0.000E+00	7.089E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.089E+02
Ra-228	6.260E-03	0.000E+00	0.000E+00	0.000E+00	4.591E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.591E+00
Th-228	1.626E-02	0.000E+00	0.000E+00	0.000E+00	1.192E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.192E+01
Th-230	5.690E-01	0.000E+00	0.000E+00	0.000E+00	4.173E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.173E+02
Th-232	2.062E-02	0.000E+00	0.000E+00	0.000E+00	1.513E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.513E+01
U-234	1.226E+00	0.000E+00	0.000E+00	0.000E+00	8.993E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.993E+02
U-235	2.724E-02	0.000E+00	0.000E+00	0.000E+00	1.998E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.998E+01
U-238	3.795E-01	0.000E+00	0.000E+00	0.000E+00	2.783E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.783E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.778E-06	0.0012	4.608E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.876E-07	0.0001
Pa-231	3.301E-10	0.0000	1.252E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.549E-11	0.0000
Pb-210	1.120E-06	0.0005	4.060E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.784E-05	0.0257
Ra-226	2.091E-03	0.9305	3.354E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.548E-05	0.0069
Ra-228	1.937E-05	0.0086	2.628E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.440E-07	0.0004
Th-228	3.260E-05	0.0145	7.037E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.920E-07	0.0001
Th-230	1.219E-07	0.0001	4.864E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.528E-06	0.0011
Th-232	1.851E-09	0.0000	2.678E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.048E-07	0.0000
U-234	8.099E-08	0.0000	4.164E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.233E-06	0.0019
U-235	3.814E-06	0.0017	8.197E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.701E-08	0.0000
U-238	1.099E-05	0.0049	1.057E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.741E-06	0.0008
Total	2.161E-03	0.9621	1.904E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.334E-05	0.0371

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.012E-06	0.0013
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.181E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.936E-05	0.0264
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.106E-03	0.9375
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.021E-05	0.0090
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.296E-05	0.0147
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.136E-06	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.334E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.730E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.920E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.284E-05	0.0057
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.247E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.777E-06	0.0012	4.607E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.875E-07	0.0001
Pb-210	7.209E-07	0.0003	2.612E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.722E-05	0.0166
Ra-226	2.082E-03	0.9269	4.784E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.598E-05	0.0160
Ra-228	3.515E-06	0.0016	5.122E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.367E-08	0.0000
Th-228	2.672E-06	0.0012	5.767E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.393E-08	0.0000
Th-230	8.635E-06	0.0038	4.880E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.649E-06	0.0012
Th-232	4.578E-05	0.0204	8.889E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.143E-06	0.0005
U-234	8.273E-08	0.0000	4.166E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.234E-06	0.0019
U-235	3.816E-06	0.0017	8.224E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.715E-08	0.0000
U-238	1.099E-05	0.0049	1.057E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.741E-06	0.0008
Total	2.161E-03	0.9621	1.904E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.334E-05	0.0371

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.011E-06	0.0013
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.820E-05	0.0170
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.119E-03	0.9431
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.593E-06	0.0016
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.701E-06	0.0012
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.177E-05	0.0052
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.701E-05	0.0209
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.733E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.921E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.284E-05	0.0057
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.247E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.071E-02	0.000E+00	0.000E+00	0.000E+00	7.854E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.854E+00
Pa-231	1.729E-06	0.000E+00	0.000E+00	0.000E+00	1.268E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.268E-03
Pb-210	1.016E+00	0.000E+00	0.000E+00	0.000E+00	7.453E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.453E+02
Ra-226	9.662E-01	0.000E+00	0.000E+00	0.000E+00	7.086E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.086E+02
Ra-228	9.337E-03	0.000E+00	0.000E+00	0.000E+00	6.847E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.847E+00
Th-228	1.202E-02	0.000E+00	0.000E+00	0.000E+00	8.817E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.817E+00
Th-230	5.690E-01	0.000E+00	0.000E+00	0.000E+00	4.173E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.173E+02
Th-232	2.062E-02	0.000E+00	0.000E+00	0.000E+00	1.512E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.512E+01
U-234	1.225E+00	0.000E+00	0.000E+00	0.000E+00	8.984E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.984E+02
U-235	2.722E-02	0.000E+00	0.000E+00	0.000E+00	1.996E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.996E+01
U-238	3.792E-01	0.000E+00	0.000E+00	0.000E+00	2.781E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.781E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.607E-06	0.0012	4.324E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.760E-07	0.0001
Pa-231	3.712E-10	0.0000	1.408E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.489E-11	0.0000
Pb-210	1.117E-06	0.0005	4.049E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.769E-05	0.0257
Ra-226	2.090E-03	0.9299	3.353E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.547E-05	0.0069
Ra-228	2.032E-05	0.0090	2.758E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.857E-07	0.0004
Th-228	3.345E-05	0.0149	7.220E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.996E-07	0.0001
Th-230	1.219E-07	0.0001	4.864E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.528E-06	0.0011
Th-232	1.851E-09	0.0000	2.678E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.048E-07	0.0000
U-234	8.091E-08	0.0000	4.160E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.229E-06	0.0019
U-235	3.811E-06	0.0017	8.189E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.692E-08	0.0000
U-238	1.098E-05	0.0049	1.056E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-06	0.0008
Total	2.162E-03	0.9621	1.901E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.322E-05	0.0370

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.826E-06	0.0013
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.702E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.921E-05	0.0263
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.106E-03	0.9369
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.121E-05	0.0094
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.382E-05	0.0150
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.136E-06	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.334E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.726E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.916E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.283E-05	0.0057
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.247E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.606E-06	0.0012	4.322E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.759E-07	0.0001
Pb-210	6.771E-07	0.0003	2.453E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.495E-05	0.0156
Ra-226	2.081E-03	0.9258	4.928E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.807E-05	0.0169
Ra-228	3.016E-06	0.0013	4.573E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.016E-08	0.0000
Th-228	1.294E-06	0.0006	2.794E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.159E-08	0.0000
Th-230	9.696E-06	0.0043	4.882E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.667E-06	0.0012
Th-232	4.946E-05	0.0220	9.437E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.218E-06	0.0005
U-234	8.301E-08	0.0000	4.162E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.230E-06	0.0019
U-235	3.812E-06	0.0017	8.221E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.708E-08	0.0000
U-238	1.098E-05	0.0049	1.056E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-06	0.0008
Total	2.162E-03	0.9621	1.901E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.322E-05	0.0370

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.825E-06	0.0013
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.587E-05	0.0160
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.119E-03	0.9430
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.080E-06	0.0014
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-06	0.0006
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.285E-05	0.0057
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.077E-05	0.0226
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.729E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.918E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.283E-05	0.0057
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.247E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	8.567E-03	0.000E+00	0.000E+00	0.000E+00	6.283E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.283E+00
Pa-231	5.751E-06	0.000E+00	0.000E+00	0.000E+00	4.217E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.217E-03
Pb-210	1.004E+00	0.000E+00	0.000E+00	0.000E+00	7.366E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.366E+02
Ra-226	9.649E-01	0.000E+00	0.000E+00	0.000E+00	7.076E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.076E+02
Ra-228	1.577E-02	0.000E+00	0.000E+00	0.000E+00	1.156E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.156E+01
Th-228	1.400E-02	0.000E+00	0.000E+00	0.000E+00	1.027E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.027E+01
Th-230	5.689E-01	0.000E+00	0.000E+00	0.000E+00	4.172E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.172E+02
Th-232	2.062E-02	0.000E+00	0.000E+00	0.000E+00	1.512E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.512E+01
U-234	1.221E+00	0.000E+00	0.000E+00	0.000E+00	8.955E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.955E+02
U-235	2.713E-02	0.000E+00	0.000E+00	0.000E+00	1.989E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.989E+01
U-238	3.779E-01	0.000E+00	0.000E+00	0.000E+00	2.772E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.772E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.086E-06	0.0009	3.460E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-07	0.0001
Pa-231	5.148E-10	0.0000	1.953E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.177E-10	0.0000
Pb-210	1.108E-06	0.0005	4.016E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.722E-05	0.0254
Ra-226	2.087E-03	0.9278	3.348E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.545E-05	0.0069
Ra-228	2.232E-05	0.0099	3.029E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.727E-07	0.0004
Th-228	3.719E-05	0.0165	8.029E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.331E-07	0.0001
Th-230	1.219E-07	0.0001	4.863E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.528E-06	0.0011
Th-232	1.851E-09	0.0000	2.677E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.047E-07	0.0000
U-234	8.065E-08	0.0000	4.147E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.215E-06	0.0019
U-235	3.799E-06	0.0017	8.162E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.661E-08	0.0000
U-238	1.095E-05	0.0049	1.053E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.734E-06	0.0008
Total	2.165E-03	0.9623	1.896E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.279E-05	0.0368

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.261E-06	0.0010
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.520E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.873E-05	0.0261
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.103E-03	0.9348
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.329E-05	0.0104
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.761E-05	0.0167
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.136E-06	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.334E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.710E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.903E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-05	0.0057
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.249E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.084E-06	0.0009	3.457E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.407E-07	0.0001
Pb-210	5.435E-07	0.0002	1.970E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.806E-05	0.0125
Ra-226	2.074E-03	0.9222	5.365E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.440E-05	0.0197
Ra-228	1.440E-06	0.0006	2.276E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.715E-08	0.0000
Th-228	1.024E-07	0.0000	2.211E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.175E-10	0.0000
Th-230	1.340E-05	0.0060	4.890E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.741E-06	0.0012
Th-232	5.797E-05	0.0258	1.076E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.382E-06	0.0006
U-234	8.430E-08	0.0000	4.149E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.216E-06	0.0019
U-235	3.801E-06	0.0017	8.212E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.684E-08	0.0000
U-238	1.095E-05	0.0049	1.053E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.734E-06	0.0008
Total	2.165E-03	0.9623	1.896E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.279E-05	0.0368

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.259E-06	0.0010
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.880E-05	0.0128
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.119E-03	0.9421
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.469E-06	0.0007
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.036E-07	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.663E-05	0.0074
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.946E-05	0.0264
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.715E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.906E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-05	0.0057
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.249E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.532E-03	0.000E+00	0.000E+00	0.000E+00	3.324E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.324E+00
Pa-231	1.716E-05	0.000E+00	0.000E+00	0.000E+00	1.258E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.258E-02
Pb-210	9.808E-01	0.000E+00	0.000E+00	0.000E+00	7.193E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.193E+02
Ra-226	9.611E-01	0.000E+00	0.000E+00	0.000E+00	7.049E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.049E+02
Ra-228	2.017E-02	0.000E+00	0.000E+00	0.000E+00	1.479E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.479E+01
Th-228	1.996E-02	0.000E+00	0.000E+00	0.000E+00	1.464E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.464E+01
Th-230	5.687E-01	0.000E+00	0.000E+00	0.000E+00	4.171E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.171E+02
Th-232	2.061E-02	0.000E+00	0.000E+00	0.000E+00	1.511E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.511E+01
U-234	1.210E+00	0.000E+00	0.000E+00	0.000E+00	8.871E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.871E+02
U-235	2.687E-02	0.000E+00	0.000E+00	0.000E+00	1.971E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.971E+01
U-238	3.744E-01	0.000E+00	0.000E+00	0.000E+00	2.746E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.746E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.106E-06	0.0005	1.834E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.465E-08	0.0000
Pa-231	9.219E-10	0.0000	3.497E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.108E-10	0.0000
Pb-210	1.090E-06	0.0005	3.949E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.625E-05	0.0251
Ra-226	2.079E-03	0.9265	3.335E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.539E-05	0.0069
Ra-228	2.368E-05	0.0106	3.214E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.032E-06	0.0005
Th-228	4.059E-05	0.0181	8.762E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.635E-07	0.0002
Th-230	1.219E-07	0.0001	4.861E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.527E-06	0.0011
Th-232	1.850E-09	0.0000	2.676E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.047E-07	0.0000
U-234	7.990E-08	0.0000	4.108E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.176E-06	0.0019
U-235	3.763E-06	0.0017	8.086E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.571E-08	0.0000
U-238	1.085E-05	0.0048	1.043E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.718E-06	0.0008
Total	2.160E-03	0.9627	1.874E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.174E-05	0.0364

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.199E-06	0.0005
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.168E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.774E-05	0.0257
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.094E-03	0.9335
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.472E-05	0.0110
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.104E-05	0.0183
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.135E-06	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.333E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.666E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.867E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.267E-05	0.0056
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.244E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.101E-06	0.0005	1.826E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.434E-08	0.0000
Pb-210	2.902E-07	0.0001	1.052E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.498E-05	0.0067
Ra-226	2.056E-03	0.9163	6.173E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.619E-05	0.0250
Ra-228	1.320E-07	0.0001	2.103E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.461E-09	0.0000
Th-228	7.298E-11	0.0000	1.575E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.536E-13	0.0000
Th-230	2.392E-05	0.0107	4.916E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.998E-06	0.0013
Th-232	6.414E-05	0.0286	1.174E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.498E-06	0.0007
U-234	9.073E-08	0.0000	4.112E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.178E-06	0.0019
U-235	3.769E-06	0.0017	8.198E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.623E-08	0.0000
U-238	1.085E-05	0.0048	1.043E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.718E-06	0.0008
Total	2.160E-03	0.9627	1.874E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.174E-05	0.0364

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.194E-06	0.0005
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.538E-05	0.0069
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.113E-03	0.9416
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.347E-07	0.0001
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.379E-11	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.741E-05	0.0122
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.576E-05	0.0293
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.680E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.873E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.267E-05	0.0056
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.244E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	5.244E-04	0.000E+00	0.000E+00	0.000E+00	3.846E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.846E-01
Pa-231	5.611E-05	0.000E+00	0.000E+00	0.000E+00	4.115E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.115E-02
Pb-210	9.476E-01	0.000E+00	0.000E+00	0.000E+00	6.949E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.949E+02
Ra-226	9.482E-01	0.000E+00	0.000E+00	0.000E+00	6.954E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.954E+02
Ra-228	2.057E-02	0.000E+00	0.000E+00	0.000E+00	1.508E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.508E+01
Th-228	2.057E-02	0.000E+00	0.000E+00	0.000E+00	1.508E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.508E+01
Th-230	5.680E-01	0.000E+00	0.000E+00	0.000E+00	4.165E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.165E+02
Th-232	2.057E-02	0.000E+00	0.000E+00	0.000E+00	1.508E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.508E+01
U-234	1.171E+00	0.000E+00	0.000E+00	0.000E+00	8.585E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.585E+02
U-235	2.601E-02	0.000E+00	0.000E+00	0.000E+00	1.908E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.908E+01
U-238	3.624E-01	0.000E+00	0.000E+00	0.000E+00	2.658E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.658E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.359E-07	0.0001	2.254E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.177E-09	0.0000
Pa-231	2.312E-09	0.0000	8.770E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.287E-10	0.0000
Pb-210	1.060E-06	0.0005	3.843E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.475E-05	0.0247
Ra-226	2.051E-03	0.9269	3.290E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-05	0.0069
Ra-228	2.377E-05	0.0107	3.226E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.036E-06	0.0005
Th-228	4.086E-05	0.0185	8.820E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.659E-07	0.0002
Th-230	1.217E-07	0.0001	4.855E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.524E-06	0.0011
Th-232	1.846E-09	0.0000	2.670E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.045E-07	0.0000
U-234	7.732E-08	0.0000	3.976E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.041E-06	0.0018
U-235	3.642E-06	0.0016	7.826E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.263E-08	0.0000
U-238	1.050E-05	0.0047	1.009E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.663E-06	0.0008
Total	2.131E-03	0.9631	1.826E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.977E-05	0.0361

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.474E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.928E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.619E-05	0.0254
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.066E-03	0.9339
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.481E-05	0.0112
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.131E-05	0.0187
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.131E-06	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.330E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.516E-06	0.0020
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.743E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.226E-05	0.0055
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.213E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.180E-07	0.0001	1.957E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.968E-09	0.0000
Pb-210	3.226E-08	0.0000	1.169E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.665E-06	0.0008
Ra-226	1.992E-03	0.9003	6.839E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.666E-05	0.0301
Ra-228	2.854E-11	0.0000	4.547E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.320E-13	0.0000
Th-228	7.042E-22	0.0000	1.520E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.307E-24	0.0000
Th-230	5.993E-05	0.0271	5.022E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.124E-06	0.0019
Th-232	6.463E-05	0.0292	1.181E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.506E-06	0.0007
U-234	1.441E-07	0.0001	3.986E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.048E-06	0.0018
U-235	3.662E-06	0.0017	8.211E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.437E-08	0.0000
U-238	1.050E-05	0.0047	1.010E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.663E-06	0.0008
Total	2.131E-03	0.9631	1.826E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.977E-05	0.0361

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-07	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.709E-06	0.0008
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.059E-03	0.9307
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.912E-11	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.120E-22	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.455E-05	0.0292
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.625E-05	0.0299
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.590E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.765E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.226E-05	0.0055
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.213E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.444E-04	0.000E+00	0.000E+00	0.000E+00	1.059E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.059E-01
Pa-231	1.594E-04	0.000E+00	0.000E+00	0.000E+00	1.169E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.169E-01
Pb-210	9.101E-01	0.000E+00	0.000E+00	0.000E+00	6.674E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.674E+02
Ra-226	9.134E-01	0.000E+00	0.000E+00	0.000E+00	6.698E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.698E+02
Ra-228	2.045E-02	0.000E+00	0.000E+00	0.000E+00	1.500E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01
Th-228	2.045E-02	0.000E+00	0.000E+00	0.000E+00	1.500E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01
Th-230	5.658E-01	0.000E+00	0.000E+00	0.000E+00	4.149E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.149E+02
Th-232	2.045E-02	0.000E+00	0.000E+00	0.000E+00	1.500E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01
U-234	1.066E+00	0.000E+00	0.000E+00	0.000E+00	7.817E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.817E+02
U-235	2.369E-02	0.000E+00	0.000E+00	0.000E+00	1.738E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.738E+01
U-238	3.301E-01	0.000E+00	0.000E+00	0.000E+00	2.421E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.421E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.726E-08	0.0000	9.497E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.866E-09	0.0000
Pa-231	5.999E-09	0.0000	2.276E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-09	0.0000
Pb-210	1.020E-06	0.0005	3.695E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.263E-05	0.0247
Ra-226	1.976E-03	0.9265	3.170E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.463E-05	0.0069
Ra-228	2.364E-05	0.0111	3.208E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.030E-06	0.0005
Th-228	4.063E-05	0.0191	8.770E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.639E-07	0.0002
Th-230	1.212E-07	0.0001	4.836E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.514E-06	0.0012
Th-232	1.836E-09	0.0000	2.655E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.039E-07	0.0000
U-234	7.040E-08	0.0000	3.620E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.679E-06	0.0017
U-235	3.318E-06	0.0016	7.129E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.438E-08	0.0000
U-238	9.562E-06	0.0045	9.195E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.515E-06	0.0007
Total	2.054E-03	0.9633	1.750E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.656E-05	0.0359

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.207E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.598E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.402E-05	0.0253
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.991E-03	0.9335
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.467E-05	0.0116
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.108E-05	0.0193
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.119E-06	0.0015
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.323E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.112E-06	0.0019
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.409E-06	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.117E-05	0.0052
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.133E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.999E-10	0.0000	3.316E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.350E-11	0.0000
Pb-210	6.069E-11	0.0000	2.199E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.133E-09	0.0000
Ra-226	1.820E-03	0.8535	6.350E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.235E-05	0.0292
Ra-228	9.626E-22	0.0000	1.533E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.794E-23	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.563E-04	0.0733	5.321E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.395E-06	0.0035
Th-232	6.427E-05	0.0301	1.175E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.498E-06	0.0007
U-234	5.374E-07	0.0003	3.648E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.706E-06	0.0017
U-235	3.381E-06	0.0016	8.303E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.960E-08	0.0000
U-238	9.562E-06	0.0045	9.205E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.516E-06	0.0007
Total	2.054E-03	0.9633	1.750E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.656E-05	0.0359

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.167E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.215E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.883E-03	0.8831
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.821E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.642E-04	0.0770
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.588E-05	0.0309
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.608E-06	0.0022
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.479E-06	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.117E-05	0.0052
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.133E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.298E-04	0.000E+00	0.000E+00	0.000E+00	3.152E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.152E-01
Pa-231	4.411E-04	0.000E+00	0.000E+00	0.000E+00	3.235E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.235E-01
Pb-210	8.083E-01	0.000E+00	0.000E+00	0.000E+00	5.928E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.928E+02
Ra-226	8.120E-01	0.000E+00	0.000E+00	0.000E+00	5.955E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.955E+02
Ra-228	2.005E-02	0.000E+00	0.000E+00	0.000E+00	1.471E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.471E+01
Th-228	2.005E-02	0.000E+00	0.000E+00	0.000E+00	1.471E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.471E+01
Th-230	5.569E-01	0.000E+00	0.000E+00	0.000E+00	4.084E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.084E+02
Th-232	2.005E-02	0.000E+00	0.000E+00	0.000E+00	1.471E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.471E+01
U-234	7.678E-01	0.000E+00	0.000E+00	0.000E+00	5.631E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.631E+02
U-235	1.709E-02	0.000E+00	0.000E+00	0.000E+00	1.253E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.253E+01
U-238	2.381E-01	0.000E+00	0.000E+00	0.000E+00	1.746E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.746E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.643E-07	0.0001	2.726E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.109E-08	0.0000
Pa-231	1.605E-08	0.0000	6.087E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.669E-09	0.0000
Pb-210	9.059E-07	0.0005	3.283E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.677E-05	0.0246
Ra-226	1.757E-03	0.9249	2.819E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.301E-05	0.0068
Ra-228	2.317E-05	0.0122	3.145E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.010E-06	0.0005
Th-228	3.984E-05	0.0210	8.599E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.568E-07	0.0002
Th-230	1.193E-07	0.0001	4.760E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.474E-06	0.0013
Th-232	1.800E-09	0.0000	2.604E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.019E-07	0.0001
U-234	5.071E-08	0.0000	2.608E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.650E-06	0.0014
U-235	2.393E-06	0.0013	5.142E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.086E-08	0.0000
U-238	6.897E-06	0.0036	6.633E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.093E-06	0.0006
Total	1.831E-03	0.9636	1.537E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.754E-05	0.0356

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

	Water		Fish		Plant		Meat		Milk		All Pathways**	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.781E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.032E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.800E-05	0.0253
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.770E-03	0.9319
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-05	0.0127
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.028E-05	0.0212
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.069E-06	0.0016
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.297E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.962E-06	0.0016
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.459E-06	0.0013
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.056E-06	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.900E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.000E-20	0.0000	6.635E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.701E-21	0.0000
Pb-210	1.752E-20	0.0000	6.347E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.042E-19	0.0000
Ra-226	1.327E-03	0.6986	4.630E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.547E-05	0.0239
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	4.270E-04	0.2248	6.143E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.662E-05	0.0087
Th-232	6.301E-05	0.0332	1.152E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.469E-06	0.0008
U-234	3.941E-06	0.0021	2.693E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.813E-06	0.0015
U-235	2.574E-06	0.0014	8.477E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.563E-08	0.0000
U-238	6.898E-06	0.0036	6.656E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-06	0.0006
Total	1.831E-03	0.9636	1.537E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.754E-05	0.0356

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.337E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.281E-19	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.373E-03	0.7228
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.443E-04	0.2339
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.459E-05	0.0340
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.023E-06	0.0037
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.658E-06	0.0014
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.060E-06	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.900E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents
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Part III: Intake Quantities and Health Risk Factors
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Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.063E-02	0.000E+00	0.000E+00	0.000E+00	8.038E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.038E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	2.825E-02	0.000E+00	0.000E+00	0.000E+00	2.135E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.135E+01
Ra-226	1.263E-01	0.000E+00	0.000E+00	0.000E+00	9.545E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.545E+01
Th-230	2.997E-01	0.000E+00	0.000E+00	0.000E+00	2.266E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.266E+02
U-234	2.339E-01	0.000E+00	0.000E+00	0.000E+00	1.768E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.768E+02
U-235	1.595E-02	0.000E+00	0.000E+00	0.000E+00	1.206E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.206E+01
U-238	7.842E-02	0.000E+00	0.000E+00	0.000E+00	5.928E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.928E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.819E-06	0.0089	4.292E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.801E-07	0.0006
Pa-231	1.978E-10	0.0000	6.872E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.270E-11	0.0000
Pb-210	7.623E-08	0.0002	2.549E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.743E-06	0.0118
Ra-226	3.006E-04	0.9464	4.432E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.108E-06	0.0066
Th-230	7.014E-08	0.0002	2.562E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-06	0.0043
U-234	1.686E-08	0.0001	7.945E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.324E-07	0.0026
U-235	2.441E-06	0.0077	4.799E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.855E-08	0.0002
U-238	2.471E-06	0.0078	2.184E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.709E-07	0.0012
Total	3.085E-04	0.9712	4.750E-07	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.666E-06	0.0273

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.042E-06	0.0096
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.473E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.845E-06	0.0121
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.028E-04	0.9531
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.699E-06	0.0053
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.287E-07	0.0029
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.504E-06	0.0079
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.864E-06	0.0090
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.177E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.819E-06	0.0089	4.291E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.800E-07	0.0006
Pb-210	2.228E-08	0.0001	7.450E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-06	0.0034
Ra-226	2.961E-04	0.9321	6.149E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.696E-06	0.0148
Th-230	4.646E-06	0.0146	2.570E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.433E-06	0.0045
U-234	1.719E-08	0.0001	7.947E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.325E-07	0.0026
U-235	2.442E-06	0.0077	4.814E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.863E-08	0.0002
U-238	2.471E-06	0.0078	2.185E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.709E-07	0.0012
Total	3.085E-04	0.9712	4.750E-07	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.666E-06	0.0273

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.041E-06	0.0096
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.124E-06	0.0035
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.009E-04	0.9471
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.336E-06	0.0199
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.292E-07	0.0029
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.505E-06	0.0079
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.864E-06	0.0090
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.177E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.030E-02	0.000E+00	0.000E+00	0.000E+00	7.786E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.786E+00
Pa-231	3.374E-07	0.000E+00	0.000E+00	0.000E+00	2.550E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.550E-04
Pb-210	3.124E-02	0.000E+00	0.000E+00	0.000E+00	2.361E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.361E+01
Ra-226	1.263E-01	0.000E+00	0.000E+00	0.000E+00	9.551E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.551E+01
Th-230	2.997E-01	0.000E+00	0.000E+00	0.000E+00	2.266E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.266E+02
U-234	2.338E-01	0.000E+00	0.000E+00	0.000E+00	1.768E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.768E+02
U-235	1.594E-02	0.000E+00	0.000E+00	0.000E+00	1.205E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.205E+01
U-238	7.839E-02	0.000E+00	0.000E+00	0.000E+00	5.925E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.925E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	2.731E-06	0.0086	4.157E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.744E-07	0.0005
Pa-231	2.109E-10	0.0000	7.329E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.554E-11	0.0000
Pb-210	7.862E-08	0.0002	2.629E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.860E-06	0.0121
Ra-226	3.008E-04	0.9463	4.435E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.110E-06	0.0066
Th-230	7.014E-08	0.0002	2.562E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-06	0.0043
U-234	1.685E-08	0.0001	7.941E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.320E-07	0.0026
U-235	2.440E-06	0.0077	4.797E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.852E-08	0.0002
U-238	2.470E-06	0.0078	2.183E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.707E-07	0.0012
Total	3.086E-04	0.9709	4.744E-07	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.778E-06	0.0276

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.947E-06	0.0093
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.638E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.965E-06	0.0125
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.029E-04	0.9531
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.699E-06	0.0053
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.282E-07	0.0029
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.503E-06	0.0079
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.863E-06	0.0090
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.179E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.730E-06	0.0086	4.156E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.744E-07	0.0005
Pb-210	2.159E-08	0.0001	7.220E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.060E-06	0.0033
Ra-226	2.960E-04	0.9312	6.248E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.844E-06	0.0152
Th-230	4.950E-06	0.0156	2.571E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.438E-06	0.0045
U-234	1.721E-08	0.0001	7.944E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.321E-07	0.0026
U-235	2.441E-06	0.0077	4.813E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.860E-08	0.0002
U-238	2.470E-06	0.0078	2.184E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.707E-07	0.0012
Total	3.086E-04	0.9709	4.744E-07	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.778E-06	0.0276

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.946E-06	0.0093
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.089E-06	0.0034
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.009E-04	0.9466
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.645E-06	0.0209
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.288E-07	0.0029
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.504E-06	0.0079
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.863E-06	0.0090
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.179E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	9.663E-03	0.000E+00	0.000E+00	0.000E+00	7.305E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.305E+00
Pa-231	1.012E-06	0.000E+00	0.000E+00	0.000E+00	7.647E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.647E-04
Pb-210	3.696E-02	0.000E+00	0.000E+00	0.000E+00	2.794E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.794E+01
Ra-226	1.265E-01	0.000E+00	0.000E+00	0.000E+00	9.562E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.562E+01
Th-230	2.997E-01	0.000E+00	0.000E+00	0.000E+00	2.266E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.266E+02
U-234	2.336E-01	0.000E+00	0.000E+00	0.000E+00	1.766E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.766E+02
U-235	1.593E-02	0.000E+00	0.000E+00	0.000E+00	1.204E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.204E+01
U-238	7.831E-02	0.000E+00	0.000E+00	0.000E+00	5.920E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.920E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.562E-06	0.0081	3.901E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.636E-07	0.0005
Pa-231	2.372E-10	0.0000	8.242E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.121E-11	0.0000
Pb-210	8.319E-08	0.0003	2.782E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.085E-06	0.0128
Ra-226	3.011E-04	0.9463	4.440E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.112E-06	0.0066
Th-230	7.013E-08	0.0002	2.561E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-06	0.0043
U-234	1.684E-08	0.0001	7.934E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.312E-07	0.0026
U-235	2.438E-06	0.0077	4.793E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.847E-08	0.0002
U-238	2.468E-06	0.0078	2.181E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.704E-07	0.0012
Total	3.088E-04	0.9703	4.733E-07	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.993E-06	0.0283

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.765E-06	0.0087
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.966E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.196E-06	0.0132
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.033E-04	0.9530
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.699E-06	0.0053
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.274E-07	0.0029
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.501E-06	0.0079
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.860E-06	0.0090
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.182E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.561E-06	0.0080	3.900E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.636E-07	0.0005
Pb-210	2.028E-08	0.0001	6.781E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.957E-07	0.0031
Ra-226	2.957E-04	0.9292	6.437E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.125E-06	0.0161
Th-230	5.558E-06	0.0175	2.572E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.448E-06	0.0046
U-234	1.727E-08	0.0001	7.937E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.314E-07	0.0026
U-235	2.438E-06	0.0077	4.811E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.856E-08	0.0002
U-238	2.468E-06	0.0078	2.182E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.704E-07	0.0012
Total	3.088E-04	0.9703	4.733E-07	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.993E-06	0.0283

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.764E-06	0.0087
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E-06	0.0032
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.009E-04	0.9455
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.264E-06	0.0228
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.280E-07	0.0029
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.502E-06	0.0079
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.860E-06	0.0090
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.182E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	7.730E-03	0.000E+00	0.000E+00	0.000E+00	5.843E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.843E+00
Pa-231	3.366E-06	0.000E+00	0.000E+00	0.000E+00	2.544E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.544E-03
Pb-210	5.443E-02	0.000E+00	0.000E+00	0.000E+00	4.114E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.114E+01
Ra-226	1.270E-01	0.000E+00	0.000E+00	0.000E+00	9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.600E+01
Th-230	2.996E-01	0.000E+00	0.000E+00	0.000E+00	2.265E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.265E+02
U-234	2.328E-01	0.000E+00	0.000E+00	0.000E+00	1.760E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.760E+02
U-235	1.588E-02	0.000E+00	0.000E+00	0.000E+00	1.200E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.200E+01
U-238	7.806E-02	0.000E+00	0.000E+00	0.000E+00	5.901E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.901E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.050E-06	0.0064	3.121E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-07	0.0004
Pa-231	3.289E-10	0.0000	1.143E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.101E-11	0.0000
Pb-210	9.719E-08	0.0003	3.250E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.772E-06	0.0149
Ra-226	3.023E-04	0.9460	4.457E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.120E-06	0.0066
Th-230	7.012E-08	0.0002	2.561E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-06	0.0043
U-234	1.678E-08	0.0001	7.908E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.285E-07	0.0026
U-235	2.430E-06	0.0076	4.777E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.828E-08	0.0002
U-238	2.460E-06	0.0077	2.174E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.691E-07	0.0012
Total	3.094E-04	0.9683	4.700E-07	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.651E-06	0.0302

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.212E-06	0.0069
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.113E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.902E-06	0.0153
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.045E-04	0.9528
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.698E-06	0.0053
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.243E-07	0.0029
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.493E-06	0.0078
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.851E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.196E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.049E-06	0.0064	3.119E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-07	0.0004
Pb-210	1.628E-08	0.0001	5.444E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.993E-07	0.0025
Ra-226	2.948E-04	0.9225	7.008E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.977E-06	0.0187
Th-230	7.682E-06	0.0240	2.576E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.488E-06	0.0047
U-234	1.754E-08	0.0001	7.912E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.287E-07	0.0026
U-235	2.431E-06	0.0076	4.806E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.842E-08	0.0002
U-238	2.460E-06	0.0077	2.174E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.692E-07	0.0012
Total	3.094E-04	0.9683	4.700E-07	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.651E-06	0.0302

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.211E-06	0.0069
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.210E-07	0.0026
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.008E-04	0.9414
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.427E-06	0.0295
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.254E-07	0.0029
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.494E-06	0.0078
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.851E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.196E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.087E-03	0.000E+00	0.000E+00	0.000E+00	3.089E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.089E+00
Pa-231	1.004E-05	0.000E+00	0.000E+00	0.000E+00	7.591E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.591E-03
Pb-210	8.806E-02	0.000E+00	0.000E+00	0.000E+00	6.657E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.657E+01
Ra-226	1.284E-01	0.000E+00	0.000E+00	0.000E+00	9.709E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.709E+01
Th-230	2.995E-01	0.000E+00	0.000E+00	0.000E+00	2.264E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.264E+02
U-234	2.307E-01	0.000E+00	0.000E+00	0.000E+00	1.744E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.744E+02
U-235	1.573E-02	0.000E+00	0.000E+00	0.000E+00	1.189E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.189E+01
U-238	7.733E-02	0.000E+00	0.000E+00	0.000E+00	5.846E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.846E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.085E-06	0.0034	1.652E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.932E-08	0.0002
Pa-231	5.889E-10	0.0000	2.047E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.272E-10	0.0000
Pb-210	1.243E-07	0.0004	4.157E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.105E-06	0.0189
Ra-226	3.057E-04	0.9457	4.507E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.144E-06	0.0066
Th-230	7.008E-08	0.0002	2.559E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.371E-06	0.0042
U-234	1.662E-08	0.0001	7.834E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.207E-07	0.0025
U-235	2.407E-06	0.0074	4.733E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.774E-08	0.0002
U-238	2.437E-06	0.0075	2.154E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.657E-07	0.0011
Total	3.118E-04	0.9647	4.637E-07	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.093E-05	0.0338

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.171E-06	0.0036
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.366E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.271E-06	0.0194
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.079E-04	0.9525
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.697E-06	0.0053
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.157E-07	0.0028
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.470E-06	0.0076
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.824E-06	0.0087
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.232E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.082E-06	0.0033	1.648E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.914E-08	0.0002
Pb-210	8.691E-09	0.0000	2.906E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.267E-07	0.0013
Ra-226	2.922E-04	0.9039	8.063E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.565E-06	0.0234
Th-230	1.371E-05	0.0424	2.590E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.628E-06	0.0050
U-234	1.887E-08	0.0001	7.842E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.212E-07	0.0025
U-235	2.411E-06	0.0075	4.798E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.805E-08	0.0002
U-238	2.437E-06	0.0075	2.154E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.658E-07	0.0011
Total	3.118E-04	0.9647	4.637E-07	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.093E-05	0.0338

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.168E-06	0.0036
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.383E-07	0.0014
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.998E-04	0.9276
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.560E-05	0.0482
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.185E-07	0.0028
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.473E-06	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.824E-06	0.0087
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.232E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.607E-04	0.000E+00	0.000E+00	0.000E+00	3.483E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.483E-01
Pa-231	3.284E-05	0.000E+00	0.000E+00	0.000E+00	2.482E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.482E-02
Pb-210	1.258E-01	0.000E+00	0.000E+00	0.000E+00	9.509E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.509E+01
Ra-226	1.334E-01	0.000E+00	0.000E+00	0.000E+00	1.008E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.008E+02
Th-230	2.988E-01	0.000E+00	0.000E+00	0.000E+00	2.259E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.259E+02
U-234	2.232E-01	0.000E+00	0.000E+00	0.000E+00	1.687E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.687E+02
U-235	1.522E-02	0.000E+00	0.000E+00	0.000E+00	1.151E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.151E+01
U-238	7.485E-02	0.000E+00	0.000E+00	0.000E+00	5.658E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.658E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.274E-07	0.0004	1.940E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.139E-09	0.0000
Pa-231	1.477E-09	0.0000	5.133E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.189E-10	0.0000
Pb-210	1.562E-07	0.0005	5.222E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.668E-06	0.0229
Ra-226	3.173E-04	0.9463	4.678E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.225E-06	0.0066
Th-230	6.993E-08	0.0002	2.554E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-06	0.0041
U-234	1.609E-08	0.0000	7.581E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.943E-07	0.0024
U-235	2.330E-06	0.0069	4.581E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.588E-08	0.0002
U-238	2.359E-06	0.0070	2.085E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.540E-07	0.0011
Total	3.223E-04	0.9614	4.576E-07	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.247E-05	0.0372

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.375E-07	0.0004
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.847E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.877E-06	0.0235
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.195E-04	0.9531
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.694E-06	0.0051
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.862E-07	0.0026
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.390E-06	0.0071
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.733E-06	0.0082
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.353E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.160E-07	0.0003	1.766E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.410E-09	0.0000
Pb-210	9.663E-10	0.0000	3.231E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.744E-08	0.0001
Ra-226	2.831E-04	0.8445	8.932E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.974E-06	0.0268
Th-230	3.435E-05	0.1025	2.645E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.239E-06	0.0067
U-234	2.994E-08	0.0001	7.601E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.956E-07	0.0024
U-235	2.343E-06	0.0070	4.806E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.693E-08	0.0002
U-238	2.359E-06	0.0070	2.086E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.540E-07	0.0011
Total	3.223E-04	0.9614	4.576E-07	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.247E-05	0.0372

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.252E-07	0.0004
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.873E-08	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.922E-04	0.8715
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.686E-05	0.1099
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.015E-07	0.0027
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.404E-06	0.0072
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.733E-06	0.0082
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.353E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	8.475E-05	0.000E+00	0.000E+00	0.000E+00	6.406E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.406E-02
Pa-231	9.330E-05	0.000E+00	0.000E+00	0.000E+00	7.053E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.053E-02
Pb-210	1.432E-01	0.000E+00	0.000E+00	0.000E+00	1.082E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.082E+02
Ra-226	1.466E-01	0.000E+00	0.000E+00	0.000E+00	1.108E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.108E+02
Th-230	2.970E-01	0.000E+00	0.000E+00	0.000E+00	2.245E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.245E+02
U-234	2.033E-01	0.000E+00	0.000E+00	0.000E+00	1.537E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.537E+02
U-235	1.387E-02	0.000E+00	0.000E+00	0.000E+00	1.048E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.048E+01
U-238	6.818E-02	0.000E+00	0.000E+00	0.000E+00	5.154E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.154E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.658E-08	0.0001	5.569E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.336E-09	0.0000
Pa-231	3.832E-09	0.0000	1.332E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.275E-10	0.0000
Pb-210	1.754E-07	0.0005	5.866E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.614E-06	0.0235
Ra-226	3.481E-04	0.9494	5.133E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.442E-06	0.0067
Th-230	6.950E-08	0.0002	2.538E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.360E-06	0.0037
U-234	1.465E-08	0.0000	6.903E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.232E-07	0.0020
U-235	2.122E-06	0.0058	4.172E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.090E-08	0.0001
U-238	2.148E-06	0.0059	1.899E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.224E-07	0.0009
Total	3.527E-04	0.9619	4.567E-07	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.351E-05	0.0369

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.947E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.793E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.848E-06	0.0241
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.506E-04	0.9562
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.683E-06	0.0046
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.069E-07	0.0022
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.177E-06	0.0059
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.490E-06	0.0068
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.667E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.965E-10	0.0000	2.992E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.255E-11	0.0000
Pb-210	1.818E-12	0.0000	6.078E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.924E-11	0.0000
Ra-226	2.587E-04	0.7056	8.294E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.394E-06	0.0229
Th-230	8.957E-05	0.2443	2.803E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.015E-06	0.0110
U-234	1.115E-07	0.0003	6.956E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.285E-07	0.0020
U-235	2.162E-06	0.0059	4.859E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.405E-08	0.0001
U-238	2.148E-06	0.0059	1.901E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.226E-07	0.0009
Total	3.527E-04	0.9619	4.567E-07	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.351E-05	0.0369

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.121E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.167E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.672E-04	0.7287
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.386E-05	0.2560
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.096E-07	0.0025
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.221E-06	0.0061
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.490E-06	0.0068
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.667E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.515E-04	0.000E+00	0.000E+00	0.000E+00	1.901E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.901E-01
Pa-231	2.581E-04	0.000E+00	0.000E+00	0.000E+00	1.951E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.951E-01
Pb-210	1.801E-01	0.000E+00	0.000E+00	0.000E+00	1.361E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.361E+02
Ra-226	1.832E-01	0.000E+00	0.000E+00	0.000E+00	1.385E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.385E+02
Th-230	2.904E-01	0.000E+00	0.000E+00	0.000E+00	2.196E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.196E+02
U-234	1.464E-01	0.000E+00	0.000E+00	0.000E+00	1.107E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.107E+02
U-235	1.000E-02	0.000E+00	0.000E+00	0.000E+00	7.561E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.561E+00
U-238	4.918E-02	0.000E+00	0.000E+00	0.000E+00	3.718E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.718E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.048E-07	0.0002	1.595E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.693E-09	0.0000
Pa-231	1.025E-08	0.0000	3.562E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.214E-09	0.0000
Pb-210	2.200E-07	0.0005	7.358E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.080E-05	0.0238
Ra-226	4.339E-04	0.9561	6.398E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.044E-06	0.0067
Th-230	6.796E-08	0.0001	2.482E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.330E-06	0.0029
U-234	1.055E-08	0.0000	4.973E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.210E-07	0.0011
U-235	1.531E-06	0.0034	3.010E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.672E-08	0.0001
U-238	1.550E-06	0.0034	1.370E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.326E-07	0.0005
Total	4.374E-04	0.9638	4.542E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.598E-05	0.0352

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.131E-07	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.282E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.110E-05	0.0245
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.371E-04	0.9629
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.646E-06	0.0036
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.813E-07	0.0013
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.570E-06	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.796E-06	0.0040
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.539E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.932E-20	0.0000	5.987E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.512E-21	0.0000
Pb-210	5.246E-22	0.0000	1.754E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.576E-20	0.0000
Ra-226	1.886E-04	0.4156	6.048E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.121E-06	0.0135
Th-230	2.448E-04	0.5393	3.236E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.023E-06	0.0199
U-234	8.178E-07	0.0018	5.135E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.529E-07	0.0012
U-235	1.646E-06	0.0036	4.961E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.562E-08	0.0001
U-238	1.550E-06	0.0034	1.375E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.331E-07	0.0005
Total	4.374E-04	0.9638	4.542E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.598E-05	0.0352

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.243E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.646E-20	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.948E-04	0.4293
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.541E-04	0.5599
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.422E-06	0.0031
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.696E-06	0.0037
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.797E-06	0.0040
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.539E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.143E-02	0.000E+00	0.000E+00	0.000E+00	1.675E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.675E+01
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	1.333E+00	0.000E+00	0.000E+00	0.000E+00	1.041E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.041E+03
Ra-226	6.551E-01	0.000E+00	0.000E+00	0.000E+00	5.118E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.118E+02
Th-230	9.283E-01	0.000E+00	0.000E+00	0.000E+00	7.252E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.252E+02
U-234	2.780E+00	0.000E+00	0.000E+00	0.000E+00	2.172E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.172E+03
U-235	9.576E-02	0.000E+00	0.000E+00	0.000E+00	7.482E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.482E+01
U-238	6.814E-01	0.000E+00	0.000E+00	0.000E+00	5.324E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.324E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.497E-06	0.0033	8.655E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.753E-07	0.0002
Pa-231	1.147E-09	0.0000	4.126E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.650E-10	0.0000
Pb-210	1.289E-06	0.0008	4.447E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.749E-05	0.0411
Ra-226	1.500E-03	0.9134	2.285E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.124E-05	0.0068
Th-230	2.099E-07	0.0001	7.935E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.394E-06	0.0027
U-234	1.936E-07	0.0001	9.441E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.022E-05	0.0062
U-235	1.416E-05	0.0086	2.881E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.633E-07	0.0002
U-238	2.078E-05	0.0127	1.898E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.331E-06	0.0020
Total	1.542E-03	0.9390	2.716E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.741E-05	0.0593

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.959E-06	0.0036
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.454E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.922E-05	0.0421
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.512E-03	0.9204
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.398E-06	0.0033
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.136E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.455E-05	0.0089
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.430E-05	0.0148
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.642E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.494E-06	0.0033	8.650E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.751E-07	0.0002
Pb-210	1.019E-06	0.0006	3.515E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.335E-05	0.0325
Ra-226	1.487E-03	0.9052	3.190E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.518E-05	0.0153
Th-230	1.392E-05	0.0085	7.959E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.588E-06	0.0028
U-234	1.974E-07	0.0001	9.444E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.022E-05	0.0062
U-235	1.416E-05	0.0086	2.890E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.638E-07	0.0002
U-238	2.078E-05	0.0127	1.898E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.331E-06	0.0020
Total	1.542E-03	0.9390	2.716E-06	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.741E-05	0.0593

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.956E-06	0.0036
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.472E-05	0.0333
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.512E-03	0.9207
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.931E-05	0.0118
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.137E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.455E-05	0.0089
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.430E-05	0.0148
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.642E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.076E-02	0.000E+00	0.000E+00	0.000E+00	1.622E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.622E+01
Pa-231	2.026E-06	0.000E+00	0.000E+00	0.000E+00	1.583E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.583E-03
Pb-210	1.312E+00	0.000E+00	0.000E+00	0.000E+00	1.025E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E+03
Ra-226	6.552E-01	0.000E+00	0.000E+00	0.000E+00	5.119E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.119E+02
Th-230	9.282E-01	0.000E+00	0.000E+00	0.000E+00	7.252E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.252E+02
U-234	2.779E+00	0.000E+00	0.000E+00	0.000E+00	2.171E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.171E+03
U-235	9.572E-02	0.000E+00	0.000E+00	0.000E+00	7.478E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.478E+01
U-238	6.811E-01	0.000E+00	0.000E+00	0.000E+00	5.321E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.321E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.325E-06	0.0032	8.384E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.635E-07	0.0002
Pa-231	1.224E-09	0.0000	4.400E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.826E-10	0.0000
Pb-210	1.273E-06	0.0008	4.391E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.665E-05	0.0406
Ra-226	1.500E-03	0.9140	2.286E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.124E-05	0.0068
Th-230	2.099E-07	0.0001	7.935E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.394E-06	0.0027
U-234	1.935E-07	0.0001	9.436E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.022E-05	0.0062
U-235	1.415E-05	0.0086	2.880E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.631E-07	0.0002
U-238	2.077E-05	0.0127	1.897E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.329E-06	0.0020
Total	1.542E-03	0.9395	2.707E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.655E-05	0.0588

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.772E-06	0.0035
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.550E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.836E-05	0.0416
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.512E-03	0.9210
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.398E-06	0.0033
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.136E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.454E-05	0.0089
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.429E-05	0.0148
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.642E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.322E-06	0.0032	8.378E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.633E-07	0.0002
Pb-210	9.873E-07	0.0006	3.407E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.170E-05	0.0315
Ra-226	1.486E-03	0.9053	3.242E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.597E-05	0.0158
Th-230	1.484E-05	0.0090	7.961E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.603E-06	0.0028
U-234	1.977E-07	0.0001	9.440E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.022E-05	0.0062
U-235	1.415E-05	0.0086	2.890E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.637E-07	0.0002
U-238	2.077E-05	0.0127	1.897E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.329E-06	0.0020
Total	1.542E-03	0.9395	2.707E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.655E-05	0.0588

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.769E-06	0.0035
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.303E-05	0.0323
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.512E-03	0.9213
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.023E-05	0.0123
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.136E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.455E-05	0.0089
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.429E-05	0.0148
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.642E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.948E-02	0.000E+00	0.000E+00	0.000E+00	1.522E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.522E+01
Pa-231	6.074E-06	0.000E+00	0.000E+00	0.000E+00	4.745E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.745E-03
Pb-210	1.271E+00	0.000E+00	0.000E+00	0.000E+00	9.932E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.932E+02
Ra-226	6.555E-01	0.000E+00	0.000E+00	0.000E+00	5.121E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.121E+02
Th-230	9.282E-01	0.000E+00	0.000E+00	0.000E+00	7.252E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.252E+02
U-234	2.776E+00	0.000E+00	0.000E+00	0.000E+00	2.169E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.169E+03
U-235	9.563E-02	0.000E+00	0.000E+00	0.000E+00	7.471E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.471E+01
U-238	6.805E-01	0.000E+00	0.000E+00	0.000E+00	5.316E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.316E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.997E-06	0.0030	7.867E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.411E-07	0.0002
Pa-231	1.376E-09	0.0000	4.948E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.178E-10	0.0000
Pb-210	1.242E-06	0.0008	4.286E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.504E-05	0.0397
Ra-226	1.501E-03	0.9152	2.287E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.124E-05	0.0069
Th-230	2.099E-07	0.0001	7.935E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.394E-06	0.0027
U-234	1.934E-07	0.0001	9.428E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.021E-05	0.0062
U-235	1.414E-05	0.0086	2.877E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.628E-07	0.0002
U-238	2.075E-05	0.0127	1.895E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.326E-06	0.0020
Total	1.542E-03	0.9405	2.691E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.491E-05	0.0579

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.416E-06	0.0033
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.743E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.671E-05	0.0407
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.512E-03	0.9222
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.397E-06	0.0033
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.134E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.453E-05	0.0089
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.427E-05	0.0148
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.640E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.993E-06	0.0030	7.860E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.408E-07	0.0002
Pb-210	9.272E-07	0.0006	3.199E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.856E-05	0.0296
Ra-226	1.485E-03	0.9053	3.340E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.748E-05	0.0168
Th-230	1.666E-05	0.0102	7.964E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.636E-06	0.0028
U-234	1.984E-07	0.0001	9.431E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.021E-05	0.0062
U-235	1.414E-05	0.0086	2.889E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.634E-07	0.0002
U-238	2.075E-05	0.0127	1.896E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.326E-06	0.0020
Total	1.542E-03	0.9405	2.691E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.491E-05	0.0579

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.412E-06	0.0033
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.980E-05	0.0304
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.513E-03	0.9223
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.209E-05	0.0135
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.135E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.453E-05	0.0089
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.427E-05	0.0148
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.640E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.558E-02	0.000E+00	0.000E+00	0.000E+00	1.217E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.217E+01
Pa-231	2.021E-05	0.000E+00	0.000E+00	0.000E+00	1.579E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.579E-02
Pb-210	1.149E+00	0.000E+00	0.000E+00	0.000E+00	8.975E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.975E+02
Ra-226	6.562E-01	0.000E+00	0.000E+00	0.000E+00	5.127E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.127E+02
Th-230	9.282E-01	0.000E+00	0.000E+00	0.000E+00	7.251E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.251E+02
U-234	2.767E+00	0.000E+00	0.000E+00	0.000E+00	2.162E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.162E+03
U-235	9.532E-02	0.000E+00	0.000E+00	0.000E+00	7.447E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.447E+01
U-238	6.782E-01	0.000E+00	0.000E+00	0.000E+00	5.299E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.299E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.000E-06	0.0024	6.298E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.731E-07	0.0002
Pa-231	1.908E-09	0.0000	6.862E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.406E-10	0.0000
Pb-210	1.149E-06	0.0007	3.963E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.015E-05	0.0368
Ra-226	1.503E-03	0.9187	2.289E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.125E-05	0.0069
Th-230	2.099E-07	0.0001	7.935E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.394E-06	0.0027
U-234	1.927E-07	0.0001	9.397E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.017E-05	0.0062
U-235	1.409E-05	0.0086	2.868E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.616E-07	0.0002
U-238	2.069E-05	0.0126	1.889E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.315E-06	0.0020
Total	1.543E-03	0.9434	2.639E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.992E-05	0.0550

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.336E-06	0.0027
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.417E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.169E-05	0.0377
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.514E-03	0.9258
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.397E-06	0.0033
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.131E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.448E-05	0.0089
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-05	0.0148
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.635E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.993E-06	0.0024	6.287E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.726E-07	0.0002
Pb-210	7.443E-07	0.0005	2.568E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.898E-05	0.0238
Ra-226	1.480E-03	0.9050	3.636E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.205E-05	0.0196
Th-230	2.302E-05	0.0141	7.977E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.763E-06	0.0029
U-234	2.014E-07	0.0001	9.402E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.018E-05	0.0062
U-235	1.410E-05	0.0086	2.885E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.625E-07	0.0002
U-238	2.069E-05	0.0126	1.889E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.315E-06	0.0020
Total	1.543E-03	0.9434	2.639E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.992E-05	0.0550

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.329E-06	0.0026
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.998E-05	0.0244
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.513E-03	0.9249
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.858E-05	0.0175
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.132E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.449E-05	0.0089
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-05	0.0148
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.635E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	8.253E-03	0.000E+00	0.000E+00	0.000E+00	6.447E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.447E+00
Pa-231	6.029E-05	0.000E+00	0.000E+00	0.000E+00	4.710E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.710E-02
Pb-210	9.168E-01	0.000E+00	0.000E+00	0.000E+00	7.163E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.163E+02
Ra-226	6.583E-01	0.000E+00	0.000E+00	0.000E+00	5.143E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.143E+02
Th-230	9.280E-01	0.000E+00	0.000E+00	0.000E+00	7.250E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.250E+02
U-234	2.741E+00	0.000E+00	0.000E+00	0.000E+00	2.142E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.142E+03
U-235	9.443E-02	0.000E+00	0.000E+00	0.000E+00	7.378E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.378E+01
U-238	6.719E-01	0.000E+00	0.000E+00	0.000E+00	5.250E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.250E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.127E-06	0.0013	3.348E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.452E-07	0.0001
Pa-231	3.417E-09	0.0000	1.229E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.891E-10	0.0000
Pb-210	9.721E-07	0.0006	3.354E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.091E-05	0.0313
Ra-226	1.507E-03	0.9257	2.296E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.129E-05	0.0069
Th-230	2.098E-07	0.0001	7.933E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.393E-06	0.0027
U-234	1.909E-07	0.0001	9.309E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.008E-05	0.0062
U-235	1.396E-05	0.0086	2.841E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.583E-07	0.0002
U-238	2.049E-05	0.0126	1.872E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.284E-06	0.0020
Total	1.545E-03	0.9490	2.538E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.046E-05	0.0494

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.306E-06	0.0014
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.329E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.222E-05	0.0321
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-03	0.9328
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.396E-06	0.0033
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.120E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.435E-05	0.0088
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.396E-05	0.0147
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.628E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.110E-06	0.0013	3.322E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.440E-07	0.0001
Pb-210	3.974E-07	0.0002	1.371E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.081E-05	0.0128
Ra-226	1.467E-03	0.9010	4.183E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.056E-05	0.0249
Th-230	4.109E-05	0.0252	8.020E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.211E-06	0.0032
U-234	2.168E-07	0.0001	9.318E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.009E-05	0.0062
U-235	1.398E-05	0.0086	2.881E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.602E-07	0.0002
U-238	2.049E-05	0.0126	1.872E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.285E-06	0.0020
Total	1.545E-03	0.9490	2.538E-06	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.046E-05	0.0494

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.287E-06	0.0014
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.134E-05	0.0131
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.508E-03	0.9261
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.710E-05	0.0289
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.123E-05	0.0069
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.437E-05	0.0088
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.396E-05	0.0147
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.628E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.021E-03	0.000E+00	0.000E+00	0.000E+00	7.973E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.973E-01
Pa-231	1.972E-04	0.000E+00	0.000E+00	0.000E+00	1.540E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.540E-01
Pb-210	6.858E-01	0.000E+00	0.000E+00	0.000E+00	5.358E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.358E+02
Ra-226	6.655E-01	0.000E+00	0.000E+00	0.000E+00	5.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.200E+02
Th-230	9.273E-01	0.000E+00	0.000E+00	0.000E+00	7.244E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.244E+02
U-234	2.653E+00	0.000E+00	0.000E+00	0.000E+00	2.072E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.072E+03
U-235	9.140E-02	0.000E+00	0.000E+00	0.000E+00	7.141E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.141E+01
U-238	6.503E-01	0.000E+00	0.000E+00	0.000E+00	5.081E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.081E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.924E-07	0.0002	4.604E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.996E-08	0.0000
Pa-231	8.570E-09	0.0000	3.082E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.979E-09	0.0000
Pb-210	7.985E-07	0.0005	2.755E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.182E-05	0.0256
Ra-226	1.524E-03	0.9337	2.321E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.141E-05	0.0070
Th-230	2.097E-07	0.0001	7.927E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.389E-06	0.0027
U-234	1.848E-07	0.0001	9.008E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.754E-06	0.0060
U-235	1.351E-05	0.0083	2.750E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.467E-07	0.0002
U-238	1.983E-05	0.0122	1.812E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.179E-06	0.0019
Total	1.559E-03	0.9551	2.415E-06	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.092E-05	0.0435

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.170E-07	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.086E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.289E-05	0.0263
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.535E-03	0.9409
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.392E-06	0.0033
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.084E-05	0.0066
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.389E-05	0.0085
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.319E-05	0.0142
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.632E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.261E-07	0.0001	3.560E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.544E-08	0.0000
Pb-210	4.418E-08	0.0000	1.525E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.314E-06	0.0014
Ra-226	1.422E-03	0.8711	4.634E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.812E-05	0.0295
Th-230	1.030E-04	0.0631	8.192E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.166E-06	0.0044
U-234	3.441E-07	0.0002	9.032E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.771E-06	0.0060
U-235	1.359E-05	0.0083	2.885E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.532E-07	0.0002
U-238	1.983E-05	0.0122	1.812E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.179E-06	0.0019
Total	1.559E-03	0.9551	2.415E-06	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.092E-05	0.0435

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.451E-07	0.0002
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.373E-06	0.0015
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.470E-03	0.9009
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.109E-04	0.0680
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.102E-05	0.0068
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.397E-05	0.0086
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.320E-05	0.0142
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.632E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	5.059E-04	0.000E+00	0.000E+00	0.000E+00	3.952E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.952E-01
Pa-231	5.602E-04	0.000E+00	0.000E+00	0.000E+00	4.377E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.377E-01
Pb-210	6.755E-01	0.000E+00	0.000E+00	0.000E+00	5.277E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.277E+02
Ra-226	6.848E-01	0.000E+00	0.000E+00	0.000E+00	5.350E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.350E+02
Th-230	9.249E-01	0.000E+00	0.000E+00	0.000E+00	7.226E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.226E+02
U-234	2.415E+00	0.000E+00	0.000E+00	0.000E+00	1.887E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.887E+03
U-235	8.325E-02	0.000E+00	0.000E+00	0.000E+00	6.504E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.504E+01
U-238	5.924E-01	0.000E+00	0.000E+00	0.000E+00	4.628E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.628E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.116E-07	0.0001	3.331E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.445E-08	0.0000
Pa-231	2.224E-08	0.0000	7.996E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.135E-09	0.0000
Pb-210	7.985E-07	0.0005	2.755E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.182E-05	0.0250
Ra-226	1.568E-03	0.9377	2.388E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.174E-05	0.0070
Th-230	2.091E-07	0.0001	7.906E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.378E-06	0.0026
U-234	1.682E-07	0.0001	8.202E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.881E-06	0.0053
U-235	1.231E-05	0.0074	2.505E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.158E-07	0.0002
U-238	1.807E-05	0.0108	1.650E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.895E-06	0.0017
Total	1.599E-03	0.9567	2.319E-06	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.005E-05	0.0419

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.294E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.817E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.289E-05	0.0257
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.580E-03	0.9449
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.378E-06	0.0032
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.870E-06	0.0059
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.265E-05	0.0076
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.113E-05	0.0126
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.672E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.831E-10	0.0000	6.031E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.615E-11	0.0000
Pb-210	8.311E-11	0.0000	2.868E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.352E-09	0.0000
Ra-226	1.299E-03	0.7770	4.303E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.501E-05	0.0269
Th-230	2.684E-04	0.1606	8.681E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.285E-05	0.0077
U-234	1.283E-06	0.0008	8.266E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.947E-06	0.0054
U-235	1.254E-05	0.0075	2.918E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.354E-07	0.0002
U-238	1.807E-05	0.0108	1.652E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.897E-06	0.0017
Total	1.599E-03	0.9567	2.319E-06	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.005E-05	0.0419

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.152E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.464E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.344E-03	0.8042
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.822E-04	0.1688
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.106E-05	0.0066
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.291E-05	0.0077
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.113E-05	0.0126
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.672E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.510E-03	0.000E+00	0.000E+00	0.000E+00	1.180E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.180E+00
Pa-231	1.550E-03	0.000E+00	0.000E+00	0.000E+00	1.211E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.211E+00
Pb-210	7.295E-01	0.000E+00	0.000E+00	0.000E+00	5.699E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.699E+02
Ra-226	7.385E-01	0.000E+00	0.000E+00	0.000E+00	5.769E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.769E+02
Th-230	9.140E-01	0.000E+00	0.000E+00	0.000E+00	7.141E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.141E+02
U-234	1.740E+00	0.000E+00	0.000E+00	0.000E+00	1.359E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.359E+03
U-235	6.005E-02	0.000E+00	0.000E+00	0.000E+00	4.692E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.692E+01
U-238	4.273E-01	0.000E+00	0.000E+00	0.000E+00	3.338E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.338E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	6.083E-07	0.0003	9.577E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.153E-08	0.0000
Pa-231	5.948E-08	0.0000	2.139E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.374E-08	0.0000
Pb-210	8.617E-07	0.0005	2.974E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.513E-05	0.0253
Ra-226	1.689E-03	0.9458	2.573E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.265E-05	0.0071
Th-230	2.066E-07	0.0001	7.812E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.326E-06	0.0024
U-234	1.212E-07	0.0001	5.908E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.397E-06	0.0036
U-235	8.878E-06	0.0050	1.807E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.278E-07	0.0001
U-238	1.303E-05	0.0073	1.190E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.089E-06	0.0012
Total	1.713E-03	0.9592	2.075E-06	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.087E-05	0.0397

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.594E-07	0.0004
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.535E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.629E-05	0.0259
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.702E-03	0.9531
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.314E-06	0.0030
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.109E-06	0.0040
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.123E-06	0.0051
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.524E-05	0.0085
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.786E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	7.665E-20	0.0000	1.207E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.233E-21	0.0000
Pb-210	2.399E-20	0.0000	8.277E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.256E-18	0.0000
Ra-226	9.472E-04	0.5304	3.138E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.282E-05	0.0184
Th-230	7.336E-04	0.4108	1.002E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.888E-05	0.0162
U-234	9.404E-06	0.0053	6.102E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.791E-06	0.0038
U-235	9.545E-06	0.0053	2.979E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.831E-07	0.0002
U-238	1.303E-05	0.0073	1.194E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.093E-06	0.0012
Total	1.713E-03	0.9592	2.075E-06	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.087E-05	0.0397

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.309E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.288E-18	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.803E-04	0.5490
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.635E-04	0.4276
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.681E-05	0.0094
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.858E-06	0.0055
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.525E-05	0.0085
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.786E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	2.319E-01	0.000E+00	0.000E+00	0.000E+00	8.294E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.294E+01
Ra-226	2.319E-01	0.000E+00	0.000E+00	0.000E+00	8.294E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.294E+01
Th-230	2.997E-01	0.000E+00	0.000E+00	0.000E+00	1.072E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.072E+02
U-234	1.193E-01	0.000E+00	0.000E+00	0.000E+00	4.267E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.267E+01
U-235	7.911E-03	0.000E+00	0.000E+00	0.000E+00	2.830E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.830E+00
U-238	5.021E-02	0.000E+00	0.000E+00	0.000E+00	1.796E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.796E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.794E-10	0.0000	3.983E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.909E-12	0.0000
Pa-231	1.045E-10	0.0000	3.399E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.994E-12	0.0000
Pb-210	2.985E-07	0.0005	9.394E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.528E-06	0.0110
Ra-226	5.817E-04	0.9779	8.081E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.819E-06	0.0031
Th-230	7.520E-08	0.0001	2.561E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.493E-07	0.0011
U-234	9.173E-09	0.0000	4.035E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.001E-07	0.0003
U-235	1.291E-06	0.0022	2.371E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.369E-08	0.0000
U-238	1.674E-06	0.0028	1.393E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.119E-07	0.0002
Total	5.850E-04	0.9835	4.875E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.322E-06	0.0157

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.913E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.920E-06	0.0116
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.836E-04	0.9811
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.805E-07	0.0016
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.496E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.307E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.799E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.948E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.939E-07	0.0003	6.103E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.241E-06	0.0071
Ra-226	5.769E-04	0.9699	1.128E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.077E-06	0.0069
Th-230	4.930E-06	0.0083	2.569E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.781E-07	0.0011
U-234	9.350E-09	0.0000	4.037E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.001E-07	0.0003
U-235	1.291E-06	0.0022	2.379E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.371E-08	0.0000
U-238	1.674E-06	0.0028	1.393E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.119E-07	0.0002
Total	5.850E-04	0.9835	4.875E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.322E-06	0.0157

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.496E-06	0.0076
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.811E-04	0.9769
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.865E-06	0.0099
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.498E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.307E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.799E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.948E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.636E-09	0.000E+00	0.000E+00	0.000E+00	9.428E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.428E-07
Pa-231	1.673E-07	0.000E+00	0.000E+00	0.000E+00	5.986E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.986E-05
Pb-210	2.318E-01	0.000E+00	0.000E+00	0.000E+00	8.291E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.291E+01
Ra-226	2.319E-01	0.000E+00	0.000E+00	0.000E+00	8.295E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.295E+01
Th-230	2.997E-01	0.000E+00	0.000E+00	0.000E+00	1.072E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.072E+02
U-234	1.192E-01	0.000E+00	0.000E+00	0.000E+00	4.264E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.264E+01
U-235	7.906E-03	0.000E+00	0.000E+00	0.000E+00	2.828E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.828E+00
U-238	5.017E-02	0.000E+00	0.000E+00	0.000E+00	1.795E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.795E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

(Column group: Radionuclides)

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.060E-10	0.0000	4.364E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.664E-12	0.0000
Pa-231	1.115E-10	0.0000	3.624E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.066E-11	0.0000
Pb-210	2.984E-07	0.0005	9.392E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.526E-06	0.0110
Ra-226	5.817E-04	0.9779	8.082E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.819E-06	0.0031
Th-230	7.519E-08	0.0001	2.561E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.492E-07	0.0011
U-234	9.166E-09	0.0000	4.033E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.999E-07	0.0003
U-235	1.290E-06	0.0022	2.370E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-08	0.0000
U-238	1.672E-06	0.0028	1.392E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.119E-07	0.0002
Total	5.851E-04	0.9835	4.874E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.320E-06	0.0157

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.191E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.258E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.919E-06	0.0116
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.836E-04	0.9811
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.805E-07	0.0016
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.494E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.306E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.798E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.949E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

(Column group: Radionuclides)

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.879E-07	0.0003	5.914E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.109E-06	0.0069
Ra-226	5.767E-04	0.9694	1.147E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.205E-06	0.0071
Th-230	5.252E-06	0.0088	2.570E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.804E-07	0.0011
U-234	9.361E-09	0.0000	4.034E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.000E-07	0.0003
U-235	1.290E-06	0.0022	2.378E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.370E-08	0.0000
U-238	1.672E-06	0.0028	1.392E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.119E-07	0.0002
Total	5.851E-04	0.9835	4.874E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.320E-06	0.0157

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.356E-06	0.0073
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.810E-04	0.9766
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.190E-06	0.0104
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.497E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.306E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.798E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.949E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	2.321E-08	0.000E+00	0.000E+00	0.000E+00	8.304E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.304E-06
Pa-231	5.016E-07	0.000E+00	0.000E+00	0.000E+00	1.794E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.794E-04
Pb-210	2.316E-01	0.000E+00	0.000E+00	0.000E+00	8.284E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.284E+01
Ra-226	2.319E-01	0.000E+00	0.000E+00	0.000E+00	8.297E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.297E+01
Th-230	2.997E-01	0.000E+00	0.000E+00	0.000E+00	1.072E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.072E+02
U-234	1.190E-01	0.000E+00	0.000E+00	0.000E+00	4.258E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.258E+01
U-235	7.894E-03	0.000E+00	0.000E+00	0.000E+00	2.824E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.824E+00
U-238	5.010E-02	0.000E+00	0.000E+00	0.000E+00	1.792E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.792E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.636E-10	0.0000	5.185E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.029E-11	0.0000
Pa-231	1.253E-10	0.0000	4.075E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.198E-11	0.0000
Pb-210	2.983E-07	0.0005	9.387E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.523E-06	0.0110
Ra-226	5.818E-04	0.9779	8.083E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.820E-06	0.0031
Th-230	7.519E-08	0.0001	2.560E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.492E-07	0.0011
U-234	9.153E-09	0.0000	4.027E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.996E-07	0.0003
U-235	1.288E-06	0.0022	2.366E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-08	0.0000
U-238	1.670E-06	0.0028	1.390E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.117E-07	0.0002
Total	5.852E-04	0.9835	4.873E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.317E-06	0.0157

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.791E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.414E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.915E-06	0.0116
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.837E-04	0.9811
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.804E-07	0.0016
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.491E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.304E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.796E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.950E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.764E-07	0.0003	5.552E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.858E-06	0.0065
Ra-226	5.761E-04	0.9683	1.181E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.449E-06	0.0075
Th-230	5.897E-06	0.0099	2.571E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.851E-07	0.0012
U-234	9.387E-09	0.0000	4.028E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.997E-07	0.0003
U-235	1.289E-06	0.0022	2.376E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-08	0.0000
U-238	1.670E-06	0.0028	1.390E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.117E-07	0.0002
Total	5.852E-04	0.9835	4.873E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.317E-06	0.0157

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.090E-06	0.0069
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.807E-04	0.9760
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.840E-06	0.0115
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.494E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.305E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.796E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.950E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	2.395E-07	0.000E+00	0.000E+00	0.000E+00	8.568E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.568E-05
Pa-231	1.667E-06	0.000E+00	0.000E+00	0.000E+00	5.963E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.963E-04
Pb-210	2.310E-01	0.000E+00	0.000E+00	0.000E+00	8.263E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.263E+01
Ra-226	2.321E-01	0.000E+00	0.000E+00	0.000E+00	8.303E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.303E+01
Th-230	2.996E-01	0.000E+00	0.000E+00	0.000E+00	1.072E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.072E+02
U-234	1.184E-01	0.000E+00	0.000E+00	0.000E+00	4.236E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.236E+01
U-235	7.855E-03	0.000E+00	0.000E+00	0.000E+00	2.810E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.810E+00
U-238	4.985E-02	0.000E+00	0.000E+00	0.000E+00	1.783E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.783E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	6.054E-10	0.0000	8.632E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.714E-11	0.0000
Pa-231	1.736E-10	0.0000	5.646E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.660E-11	0.0000
Pb-210	2.978E-07	0.0005	9.374E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.514E-06	0.0109
Ra-226	5.822E-04	0.9780	8.089E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.821E-06	0.0031
Th-230	7.516E-08	0.0001	2.559E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.489E-07	0.0011
U-234	9.107E-09	0.0000	4.006E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.986E-07	0.0003
U-235	1.282E-06	0.0022	2.354E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.359E-08	0.0000
U-238	1.662E-06	0.0028	1.383E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.111E-07	0.0002
Total	5.856E-04	0.9835	4.868E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.307E-06	0.0156

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.312E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.959E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.906E-06	0.0116
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.841E-04	0.9812
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.801E-07	0.0016
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.478E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.298E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.787E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.953E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Pb-210	1.415E-07	0.0002	4.452E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.094E-06	0.0052
Ra-226	5.743E-04	0.9647	1.286E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.186E-06	0.0087
Th-230	8.150E-06	0.0137	2.575E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.038E-07	0.0012
U-234	9.516E-09	0.0000	4.009E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.987E-07	0.0003
U-235	1.282E-06	0.0022	2.369E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.363E-08	0.0000
U-238	1.662E-06	0.0028	1.383E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.111E-07	0.0002
Total	5.856E-04	0.9835	4.868E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.307E-06	0.0156

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All pathways risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.280E-06	0.0055
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.796E-04	0.9736
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.111E-06	0.0153
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.483E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.298E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.787E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.953E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.769E-06	0.000E+00	0.000E+00	0.000E+00	6.330E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.330E-04
Pa-231	4.959E-06	0.000E+00	0.000E+00	0.000E+00	1.774E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.774E-03
Pb-210	2.300E-01	0.000E+00	0.000E+00	0.000E+00	8.229E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.229E+01
Ra-226	2.325E-01	0.000E+00	0.000E+00	0.000E+00	8.319E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.319E+01
Th-230	2.993E-01	0.000E+00	0.000E+00	0.000E+00	1.071E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.071E+02
U-234	1.167E-01	0.000E+00	0.000E+00	0.000E+00	4.175E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.175E+01
U-235	7.742E-03	0.000E+00	0.000E+00	0.000E+00	2.770E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.770E+00
U-238	4.913E-02	0.000E+00	0.000E+00	0.000E+00	1.758E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.758E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	1.548E-09	0.0000	2.208E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.383E-11	0.0000
Pa-231	3.101E-10	0.0000	1.008E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.965E-11	0.0000
Pb-210	2.973E-07	0.0005	9.356E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.501E-06	0.0109
Ra-226	5.833E-04	0.9781	8.104E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.824E-06	0.0031
Th-230	7.509E-08	0.0001	2.557E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.483E-07	0.0011
U-234	8.976E-09	0.0000	3.949E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.958E-07	0.0003
U-235	1.263E-06	0.0021	2.321E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.340E-08	0.0000
U-238	1.638E-06	0.0027	1.363E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-07	0.0002
Total	5.866E-04	0.9836	4.858E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.293E-06	0.0156

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.614E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.499E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.892E-06	0.0116
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.853E-04	0.9813
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.791E-07	0.0016
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.442E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-06	0.0021
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.761E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.964E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	7.528E-08	0.0001	2.369E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.646E-06	0.0028
Ra-226	5.691E-04	0.9542	1.478E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.558E-06	0.0110
Th-230	1.454E-05	0.0244	2.588E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.697E-07	0.0013
U-234	1.019E-08	0.0000	3.953E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.959E-07	0.0003
U-235	1.265E-06	0.0021	2.353E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.347E-08	0.0000
U-238	1.638E-06	0.0027	1.364E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.095E-07	0.0002
Total	5.866E-04	0.9836	4.858E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.293E-06	0.0156

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.745E-06	0.0029
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.758E-04	0.9655
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.557E-05	0.0261
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.456E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-06	0.0021
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.761E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.964E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.129E-05	0.000E+00	0.000E+00	0.000E+00	4.039E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.039E-03
Pa-231	1.606E-05	0.000E+00	0.000E+00	0.000E+00	5.744E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.744E-03
Pb-210	2.302E-01	0.000E+00	0.000E+00	0.000E+00	8.234E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.234E+01
Ra-226	2.341E-01	0.000E+00	0.000E+00	0.000E+00	8.374E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.374E+01
Th-230	2.983E-01	0.000E+00	0.000E+00	0.000E+00	1.067E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.067E+02
U-234	1.110E-01	0.000E+00	0.000E+00	0.000E+00	3.969E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.969E+01
U-235	7.361E-03	0.000E+00	0.000E+00	0.000E+00	2.633E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.633E+00
U-238	4.671E-02	0.000E+00	0.000E+00	0.000E+00	1.671E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.671E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	5.961E-09	0.0000	8.500E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.688E-10	0.0000
Pa-231	7.702E-10	0.0000	2.504E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.363E-11	0.0000
Pb-210	2.981E-07	0.0005	9.381E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.518E-06	0.0109
Ra-226	5.871E-04	0.9784	8.157E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.836E-06	0.0031
Th-230	7.483E-08	0.0001	2.548E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.461E-07	0.0011
U-234	8.533E-09	0.0000	3.754E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.861E-07	0.0003
U-235	1.201E-06	0.0020	2.206E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.274E-08	0.0000
U-238	1.557E-06	0.0026	1.296E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.041E-07	0.0002
Total	5.903E-04	0.9837	4.830E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.304E-06	0.0155

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.215E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.689E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.910E-06	0.0115
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.891E-04	0.9816
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.757E-07	0.0016
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.322E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.216E-06	0.0020
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.674E-06	0.0028
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.001E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	8.275E-09	0.0000	2.604E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.810E-07	0.0003
Ra-226	5.511E-04	0.9184	1.634E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.763E-06	0.0129
Th-230	3.640E-05	0.0607	2.640E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.057E-06	0.0018
U-234	1.595E-08	0.0000	3.764E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.864E-07	0.0003
U-235	1.208E-06	0.0020	2.316E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.298E-08	0.0000
U-238	1.557E-06	0.0026	1.297E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.042E-07	0.0002
Total	5.903E-04	0.9837	4.830E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.304E-06	0.0155

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.919E-07	0.0003
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.590E-04	0.9316
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.772E-05	0.0629
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.400E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.223E-06	0.0020
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.674E-06	0.0028
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.001E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.006E-05	0.000E+00	0.000E+00	0.000E+00	1.433E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.433E-02
Pa-231	4.436E-05	0.000E+00	0.000E+00	0.000E+00	1.587E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.587E-02
Pb-210	2.340E-01	0.000E+00	0.000E+00	0.000E+00	8.370E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.370E+01
Ra-226	2.380E-01	0.000E+00	0.000E+00	0.000E+00	8.515E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.515E+01
Th-230	2.953E-01	0.000E+00	0.000E+00	0.000E+00	1.056E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.056E+02
U-234	9.603E-02	0.000E+00	0.000E+00	0.000E+00	3.435E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.435E+01
U-235	6.372E-03	0.000E+00	0.000E+00	0.000E+00	2.280E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.280E+00
U-238	4.044E-02	0.000E+00	0.000E+00	0.000E+00	1.447E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.447E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.848E-08	0.0000	2.635E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.232E-10	0.0000
Pa-231	1.943E-09	0.0000	6.319E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.858E-10	0.0000
Pb-210	3.030E-07	0.0005	9.536E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.627E-06	0.0109
Ra-226	5.969E-04	0.9792	8.293E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.867E-06	0.0031
Th-230	7.409E-08	0.0001	2.523E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.397E-07	0.0010
U-234	7.384E-09	0.0000	3.249E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.611E-07	0.0003
U-235	1.040E-06	0.0017	1.910E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.103E-08	0.0000
U-238	1.348E-06	0.0022	1.122E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.016E-08	0.0001
Total	5.997E-04	0.9838	4.766E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.396E-06	0.0154

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.927E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.192E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.025E-06	0.0115
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.989E-04	0.9824
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.661E-07	0.0016
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.009E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.053E-06	0.0017
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.449E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.096E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.507E-11	0.0000	4.743E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.296E-10	0.0000
Ra-226	5.026E-04	0.8245	1.514E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.244E-06	0.0119
Th-230	9.467E-05	0.1553	2.789E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.888E-06	0.0031
U-234	5.832E-08	0.0001	3.275E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.623E-07	0.0003
U-235	1.060E-06	0.0017	2.237E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.174E-08	0.0000
U-238	1.348E-06	0.0022	1.123E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.022E-08	0.0001
Total	5.997E-04	0.9838	4.766E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.396E-06	0.0154

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.494E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.100E-04	0.8366
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.684E-05	0.1589
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.534E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.074E-06	0.0018
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.449E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.096E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					
Radio- Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.093E-04	0.000E+00	0.000E+00	0.000E+00	3.911E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.911E-02
Pa-231	1.119E-04	0.000E+00	0.000E+00	0.000E+00	4.003E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.003E-02
Pb-210	2.436E-01	0.000E+00	0.000E+00	0.000E+00	8.715E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.715E+01
Ra-226	2.475E-01	0.000E+00	0.000E+00	0.000E+00	8.855E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.855E+01
Th-230	2.851E-01	0.000E+00	0.000E+00	0.000E+00	1.020E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.020E+02
U-234	5.790E-02	0.000E+00	0.000E+00	0.000E+00	2.071E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.071E+01
U-235	3.846E-03	0.000E+00	0.000E+00	0.000E+00	1.376E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.376E+00
U-238	2.441E-02	0.000E+00	0.000E+00	0.000E+00	8.732E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.732E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.857E-08	0.0001	6.921E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.374E-09	0.0000
Pa-231	4.744E-09	0.0000	1.541E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.533E-10	0.0000
Pb-210	3.153E-07	0.0005	9.924E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.896E-06	0.0109
Ra-226	6.205E-04	0.9811	8.619E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.940E-06	0.0031
Th-230	7.155E-08	0.0001	2.436E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.176E-07	0.0010
U-234	4.452E-09	0.0000	1.959E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.711E-08	0.0002
U-235	6.279E-07	0.0010	1.153E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.656E-09	0.0000
U-238	8.141E-07	0.0013	6.773E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.442E-08	0.0001
Total	6.224E-04	0.9841	4.574E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.614E-06	0.0152

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.064E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.351E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.310E-06	0.0116
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.225E-04	0.9843
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.328E-07	0.0015
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.212E-07	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.357E-07	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.753E-07	0.0014
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.324E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	3.883E-21	0.0000	1.222E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.492E-20	0.0000
Ra-226	3.640E-04	0.5756	1.097E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.246E-06	0.0083
Th-230	2.565E-04	0.4055	3.186E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.200E-06	0.0066
U-234	4.037E-07	0.0006	2.032E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.041E-07	0.0002
U-235	6.812E-07	0.0011	1.999E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.483E-09	0.0000
U-238	8.143E-07	0.0013	6.797E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.454E-08	0.0001
Total	6.224E-04	0.9841	4.574E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.614E-06	0.0152

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.003E-20	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.694E-04	0.5840
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.610E-04	0.4126
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.281E-07	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.917E-07	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.756E-07	0.0014
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.324E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

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0      ³                                                              ³  Current  ³           ³  Parameter
  Menu ³                         Parameter                            ³   Value   ³  Default  ³    Name
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 Sf-Rn ³ Radon Inhalation slope factors, 1/(pCi):                     ³           ³           ³
 Sf-Rn ³ Rn-222                                                       ³ 1.80E-12  ³ 1.80E-12  ³ SLPFRN(1,1)
 Sf-Rn ³ Po-218                                                       ³ 3.70E-12  ³ 3.70E-12  ³ SLPFRN(1,2)
 Sf-Rn ³ Pb-214                                                       ³ 6.20E-12  ³ 6.20E-12  ³ SLPFRN(1,3)
 Sf-Rn ³ Bi-214                                                       ³ 1.50E-11  ³ 1.50E-11  ³ SLPFRN(1,4)
 Sf-Rn ³ Radon K factors, (mrem/WLM):                                 ³           ³           ³
 Sf-Rn ³ Rn-222 Indoor                                                ³ 7.60E+02  ³ 7.60E+02  ³ KFACTR(1,1)
 Sf-Rn ³ Rn-222 Outdoor                                               ³ 5.70E+02  ³ 5.70E+02  ³ KFACTR(1,2)
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

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           Water Independent Pathways (Inhalation w/o radon)                      Water Dependent Pathways
 Radio-   ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ   Total
 Nuclide  Inhalation   Plant       Meat        Milk        Soil       Water        Fish       Plant       Meat        Milk     Ingestion*
 ÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
 Ac-227    8.569E-03  0.000E+00  0.000E+00  0.000E+00  1.046E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.046E+00
 Pa-231    0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
 Pb-210    1.218E-01  0.000E+00  0.000E+00  0.000E+00  1.487E+01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.487E+01
 Ra-226    1.218E-01  0.000E+00  0.000E+00  0.000E+00  1.487E+01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.487E+01
 Th-230    2.370E-01  0.000E+00  0.000E+00  0.000E+00  2.892E+01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  2.892E+01
 U-234     6.481E-02  0.000E+00  0.000E+00  0.000E+00  7.909E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  7.909E+00
 U-235     1.312E-02  0.000E+00  0.000E+00  0.000E+00  1.601E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.601E+00
 U-238     8.891E-02  0.000E+00  0.000E+00  0.000E+00  1.085E+01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  1.085E+01
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 * Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
   and water-dependent water, fish, plant, meat, milk pathways
0
          Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
                    Radon and its Decay Products as pCi/yr at t= 0.000E+00 years
0                                                 Radionuclides
   Radon     ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
   Pathway     Rn-222     Po-218     Pb-214     Bi-214     Rn-220     Po-216     Pb-212     Bi-212
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  Water-ind.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
  Water-dep.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
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  Total       0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00

  Water-ind. == Water-independent    Water-dep. == Water-dependent
0
                 Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
                                and Fraction of Total Risk at t= 0.000E+00 years
0                                    Water Independent Pathways (Inhalation excludes radon)
0             Ground           Inhalation            Plant              Meat               Milk               Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide    risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
 Ac-227  2.562E-06 0.0077  3.458E-08 0.0001  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  2.342E-08 0.0001
 Pa-231  1.840E-10 0.0000  5.647E-12 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  5.665E-12 0.0000

 Pb-210  1.675E-07 0.0005  4.947E-08 0.0001  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.173E-06 0.0035
 Ra-226  3.221E-04 0.9687  4.265E-08 0.0001  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  3.275E-07 0.0010
 Th-230  6.320E-08 0.0002  2.025E-07 0.0006  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.752E-07 0.0005
 U-234   5.346E-09 0.0000  2.198E-08 0.0001  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  3.717E-08 0.0001
 U-235   2.277E-06 0.0068  3.942E-09 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  7.765E-09 0.0000
 U-238   3.127E-06 0.0094  2.473E-08 0.0001  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  6.778E-08 0.0002
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 Total   3.303E-04 0.9934  3.799E-07 0.0011  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.812E-06 0.0054
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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.620E-06	0.0079
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.953E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.390E-06	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.225E-04	0.9699
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.409E-07	0.0013
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.450E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.288E-06	0.0069
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.219E-06	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.325E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.562E-06	0.0077	3.457E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.342E-08	0.0001
Pb-210	1.087E-07	0.0003	3.211E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.613E-07	0.0023
Ra-226	3.181E-04	0.9568	5.932E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.314E-07	0.0022
Th-230	4.091E-06	0.0123	2.032E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-07	0.0006
U-234	5.447E-09	0.0000	2.198E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.718E-08	0.0001
U-235	2.277E-06	0.0068	3.955E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.775E-09	0.0000
U-238	3.127E-06	0.0094	2.473E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.778E-08	0.0002
Total	3.303E-04	0.9934	3.799E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.812E-06	0.0054

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.620E-06	0.0079
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.021E-07	0.0027
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.189E-04	0.9592
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.477E-06	0.0135
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.461E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.289E-06	0.0069
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.219E-06	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.325E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	8.300E-03	0.000E+00	0.000E+00	0.000E+00	1.013E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.013E+00
Pa-231	2.775E-07	0.000E+00	0.000E+00	0.000E+00	3.387E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.387E-05
Pb-210	1.218E-01	0.000E+00	0.000E+00	0.000E+00	1.487E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.487E+01
Ra-226	1.219E-01	0.000E+00	0.000E+00	0.000E+00	1.488E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.488E+01
Th-230	2.370E-01	0.000E+00	0.000E+00	0.000E+00	2.892E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.892E+01
U-234	6.477E-02	0.000E+00	0.000E+00	0.000E+00	7.905E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.905E+00
U-235	1.311E-02	0.000E+00	0.000E+00	0.000E+00	1.601E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.601E+00
U-238	8.886E-02	0.000E+00	0.000E+00	0.000E+00	1.084E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.084E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.482E-06	0.0075	3.350E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.269E-08	0.0001
Pa-231	1.963E-10	0.0000	6.022E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.041E-12	0.0000
Pb-210	1.674E-07	0.0005	4.947E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.173E-06	0.0035
Ra-226	3.222E-04	0.9690	4.266E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.277E-07	0.0010
Th-230	6.319E-08	0.0002	2.025E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.752E-07	0.0005
U-234	5.343E-09	0.0000	2.196E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.715E-08	0.0001
U-235	2.275E-06	0.0068	3.940E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.760E-09	0.0000
U-238	3.125E-06	0.0094	2.471E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.774E-08	0.0002
Total	3.303E-04	0.9934	3.787E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.811E-06	0.0054

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.538E-06	0.0076
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.083E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.390E-06	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.226E-04	0.9701
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.409E-07	0.0013
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.446E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.287E-06	0.0069
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.217E-06	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.325E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.481E-06	0.0075	3.349E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.268E-08	0.0001
Pb-210	1.053E-07	0.0003	3.112E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.377E-07	0.0022
Ra-226	3.180E-04	0.9563	6.028E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.543E-07	0.0023
Th-230	4.359E-06	0.0131	2.032E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.836E-07	0.0006
U-234	5.455E-09	0.0000	2.197E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.716E-08	0.0001
U-235	2.276E-06	0.0068	3.953E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.771E-09	0.0000
U-238	3.125E-06	0.0094	2.471E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.774E-08	0.0002
Total	3.303E-04	0.9934	3.787E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.811E-06	0.0054

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.537E-06	0.0076
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.742E-07	0.0026
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.188E-04	0.9587
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.746E-06	0.0143
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.458E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.288E-06	0.0069
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.217E-06	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.325E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	7.787E-03	0.000E+00	0.000E+00	0.000E+00	9.503E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.503E-01
Pa-231	8.321E-07	0.000E+00	0.000E+00	0.000E+00	1.015E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.015E-04
Pb-210	1.217E-01	0.000E+00	0.000E+00	0.000E+00	1.486E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.486E+01
Ra-226	1.220E-01	0.000E+00	0.000E+00	0.000E+00	1.489E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.489E+01
Th-230	2.370E-01	0.000E+00	0.000E+00	0.000E+00	2.892E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.892E+01
U-234	6.470E-02	0.000E+00	0.000E+00	0.000E+00	7.896E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.896E+00
U-235	1.310E-02	0.000E+00	0.000E+00	0.000E+00	1.599E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.599E+00
U-238	8.876E-02	0.000E+00	0.000E+00	0.000E+00	1.083E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.083E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.328E-06	0.0070	3.143E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.129E-08	0.0001
Pa-231	2.207E-10	0.0000	6.772E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.793E-12	0.0000
Pb-210	1.674E-07	0.0005	4.946E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.173E-06	0.0035
Ra-226	3.225E-04	0.9695	4.270E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.279E-07	0.0010
Th-230	6.319E-08	0.0002	2.025E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.751E-07	0.0005
U-234	5.337E-09	0.0000	2.194E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.711E-08	0.0001
U-235	2.273E-06	0.0068	3.936E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.752E-09	0.0000
U-238	3.121E-06	0.0094	2.469E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.767E-08	0.0002
Total	3.304E-04	0.9934	3.766E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.810E-06	0.0054

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.381E-06	0.0072
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.342E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.389E-06	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.228E-04	0.9706
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.408E-07	0.0013
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.439E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.285E-06	0.0069
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.214E-06	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.326E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.328E-06	0.0070	3.142E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.128E-08	0.0001
Pb-210	9.891E-08	0.0003	2.922E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.927E-07	0.0021
Ra-226	3.177E-04	0.9552	6.209E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.981E-07	0.0024
Th-230	4.894E-06	0.0147	2.033E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.849E-07	0.0006
U-234	5.471E-09	0.0000	2.195E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.712E-08	0.0001
U-235	2.274E-06	0.0068	3.951E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.764E-09	0.0000
U-238	3.121E-06	0.0094	2.469E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.767E-08	0.0002
Total	3.304E-04	0.9934	3.766E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.810E-06	0.0054

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.380E-06	0.0072
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.209E-07	0.0025
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.186E-04	0.9578
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.283E-06	0.0159
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.453E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.285E-06	0.0069
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.214E-06	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.326E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					
Radio- Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	6.228E-03	0.000E+00	0.000E+00	0.000E+00	7.601E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.601E-01
Pa-231	2.767E-06	0.000E+00	0.000E+00	0.000E+00	3.377E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.377E-04
Pb-210	1.215E-01	0.000E+00	0.000E+00	0.000E+00	1.483E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.483E+01
Ra-226	1.223E-01	0.000E+00	0.000E+00	0.000E+00	1.493E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.493E+01
Th-230	2.369E-01	0.000E+00	0.000E+00	0.000E+00	2.891E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.891E+01
U-234	6.444E-02	0.000E+00	0.000E+00	0.000E+00	7.864E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.864E+00
U-235	1.305E-02	0.000E+00	0.000E+00	0.000E+00	1.592E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.592E+00
U-238	8.840E-02	0.000E+00	0.000E+00	0.000E+00	1.079E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.079E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0	Radionuclides							
Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.863E-06	0.0056	2.514E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.703E-08	0.0001
Pa-231	3.059E-10	0.0000	9.387E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.417E-12	0.0000
Pb-210	1.674E-07	0.0005	4.946E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.173E-06	0.0035
Ra-226	3.233E-04	0.9710	4.281E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.288E-07	0.0010
Th-230	6.317E-08	0.0002	2.024E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.751E-07	0.0005
U-234	5.316E-09	0.0000	2.185E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.696E-08	0.0001
U-235	2.264E-06	0.0068	3.920E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.721E-09	0.0000
U-238	3.109E-06	0.0093	2.459E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.740E-08	0.0002
Total	3.308E-04	0.9935	3.702E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.806E-06	0.0054

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.905E-06	0.0057
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.247E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.389E-06	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.237E-04	0.9721
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.407E-07	0.0013
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.413E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.275E-06	0.0068
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.201E-06	0.0096
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.330E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.862E-06	0.0056	2.513E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.702E-08	0.0001
Pb-210	7.937E-08	0.0002	2.345E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.559E-07	0.0017
Ra-226	3.167E-04	0.9512	6.759E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.306E-07	0.0028
Th-230	6.764E-06	0.0203	2.036E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.899E-07	0.0006
U-234	5.550E-09	0.0000	2.186E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.697E-08	0.0001
U-235	2.265E-06	0.0068	3.944E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.740E-09	0.0000
U-238	3.109E-06	0.0093	2.459E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.740E-08	0.0002
Total	3.308E-04	0.9935	3.702E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.806E-06	0.0054

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.904E-06	0.0057
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.587E-07	0.0020
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.177E-04	0.9542
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.157E-06	0.0215
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.438E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.277E-06	0.0068
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.201E-06	0.0096
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.330E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	3.292E-03	0.000E+00	0.000E+00	0.000E+00	4.018E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.018E-01
Pa-231	8.247E-06	0.000E+00	0.000E+00	0.000E+00	1.006E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.006E-03
Pb-210	1.215E-01	0.000E+00	0.000E+00	0.000E+00	1.483E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.483E+01
Ra-226	1.232E-01	0.000E+00	0.000E+00	0.000E+00	1.504E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.504E+01
Th-230	2.367E-01	0.000E+00	0.000E+00	0.000E+00	2.889E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.889E+01
U-234	6.371E-02	0.000E+00	0.000E+00	0.000E+00	7.776E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.776E+00
U-235	1.290E-02	0.000E+00	0.000E+00	0.000E+00	1.574E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.574E+00
U-238	8.741E-02	0.000E+00	0.000E+00	0.000E+00	1.067E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.067E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.860E-07	0.0029	1.331E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.014E-09	0.0000
Pa-231	5.473E-10	0.0000	1.679E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.685E-11	0.0000
Pb-210	1.678E-07	0.0005	4.958E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.175E-06	0.0035
Ra-226	3.258E-04	0.9740	4.313E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.313E-07	0.0010
Th-230	6.312E-08	0.0002	2.023E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.750E-07	0.0005
U-234	5.256E-09	0.0000	2.161E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.655E-08	0.0001
U-235	2.238E-06	0.0067	3.876E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.634E-09	0.0000
U-238	3.074E-06	0.0092	2.431E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.664E-08	0.0002
Total	3.323E-04	0.9935	3.581E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.801E-06	0.0054

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.008E-06	0.0030
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.809E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.393E-06	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.261E-04	0.9751
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.403E-07	0.0013
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.341E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.250E-06	0.0067
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.165E-06	0.0095
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.345E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.832E-07	0.0029	1.327E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.989E-09	0.0000
Pb-210	4.232E-08	0.0001	1.250E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.964E-07	0.0009
Ra-226	3.139E-04	0.9385	7.775E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.177E-06	0.0035
Th-230	1.207E-05	0.0361	2.047E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.077E-07	0.0006
U-234	5.948E-09	0.0000	2.163E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.656E-08	0.0001
U-235	2.242E-06	0.0067	3.929E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.676E-09	0.0000
U-238	3.074E-06	0.0092	2.431E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.664E-08	0.0002
Total	3.323E-04	0.9935	3.581E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.801E-06	0.0054

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.006E-06	0.0030
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.512E-07	0.0011
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.151E-04	0.9422
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.248E-05	0.0373
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.413E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.253E-06	0.0067
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.165E-06	0.0095
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.345E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	3.711E-04	0.000E+00	0.000E+00	0.000E+00	4.528E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.528E-02
Pa-231	2.686E-05	0.000E+00	0.000E+00	0.000E+00	3.278E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.278E-03
Pb-210	1.237E-01	0.000E+00	0.000E+00	0.000E+00	1.510E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.510E+01
Ra-226	1.264E-01	0.000E+00	0.000E+00	0.000E+00	1.543E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.543E+01
Th-230	2.360E-01	0.000E+00	0.000E+00	0.000E+00	2.881E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.881E+01
U-234	6.124E-02	0.000E+00	0.000E+00	0.000E+00	7.474E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.474E+00
U-235	1.240E-02	0.000E+00	0.000E+00	0.000E+00	1.513E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.513E+00
U-238	8.401E-02	0.000E+00	0.000E+00	0.000E+00	1.025E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.158E-07	0.0003	1.563E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.059E-09	0.0000
Pa-231	1.367E-09	0.0000	4.195E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.208E-11	0.0000
Pb-210	1.713E-07	0.0005	5.061E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.200E-06	0.0035
Ra-226	3.341E-04	0.9777	4.423E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.397E-07	0.0010
Th-230	6.294E-08	0.0002	2.017E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.745E-07	0.0005
U-234	5.052E-09	0.0000	2.077E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.513E-08	0.0001
U-235	2.151E-06	0.0063	3.725E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.337E-09	0.0000
U-238	2.955E-06	0.0086	2.337E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.405E-08	0.0002
Total	3.395E-04	0.9937	3.460E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.822E-06	0.0053

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.184E-07	0.0003
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.451E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.422E-06	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.345E-04	0.9788
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.391E-07	0.0013
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.095E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.162E-06	0.0063
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.042E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.417E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.053E-07	0.0003	1.421E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.625E-10	0.0000
Pb-210	4.684E-09	0.0000	1.384E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.281E-08	0.0001
Ra-226	3.041E-04	0.8899	8.607E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.396E-06	0.0041
Th-230	3.023E-05	0.0885	2.090E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.855E-07	0.0008
U-234	9.307E-09	0.0000	2.081E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.517E-08	0.0001
U-235	2.163E-06	0.0063	3.909E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.475E-09	0.0000
U-238	2.955E-06	0.0086	2.337E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.406E-08	0.0002
Total	3.395E-04	0.9937	3.460E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.822E-06	0.0053

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.077E-07	0.0003
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.888E-08	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.056E-04	0.8942
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.072E-05	0.0899
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.530E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.175E-06	0.0064
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.042E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.417E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	6.864E-05	0.000E+00	0.000E+00	0.000E+00	8.377E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.377E-03
Pa-231	7.549E-05	0.000E+00	0.000E+00	0.000E+00	9.213E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.213E-03
Pb-210	1.321E-01	0.000E+00	0.000E+00	0.000E+00	1.612E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.612E+01
Ra-226	1.349E-01	0.000E+00	0.000E+00	0.000E+00	1.646E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.646E+01
Th-230	2.341E-01	0.000E+00	0.000E+00	0.000E+00	2.857E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.857E+01
U-234	5.469E-02	0.000E+00	0.000E+00	0.000E+00	6.675E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.675E+00
U-235	1.107E-02	0.000E+00	0.000E+00	0.000E+00	1.351E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.351E+00
U-238	7.501E-02	0.000E+00	0.000E+00	0.000E+00	9.154E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.154E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.339E-08	0.0001	4.506E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.053E-10	0.0000
Pa-231	3.509E-09	0.0000	1.077E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.080E-10	0.0000
Pb-210	1.828E-07	0.0005	5.401E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-06	0.0035
Ra-226	3.561E-04	0.9805	4.716E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.622E-07	0.0010
Th-230	6.242E-08	0.0002	2.000E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.730E-07	0.0005
U-234	4.512E-09	0.0000	1.855E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.137E-08	0.0001
U-235	1.921E-06	0.0053	3.326E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.551E-09	0.0000
U-238	2.638E-06	0.0073	2.086E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.718E-08	0.0002
Total	3.610E-04	0.9938	3.445E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.911E-06	0.0053

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.414E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.724E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.517E-06	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.566E-04	0.9816
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.355E-07	0.0012
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.443E-08	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.931E-06	0.0053
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-06	0.0075
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.633E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

(Radionuclides)

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.778E-10	0.0000	2.400E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.626E-12	0.0000
Pb-210	8.699E-12	0.0000	2.570E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.093E-11	0.0000
Ra-226	2.776E-04	0.7643	7.985E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.304E-06	0.0036
Th-230	7.874E-05	0.2168	2.212E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.113E-07	0.0014
U-234	3.406E-08	0.0001	1.867E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.157E-08	0.0001
U-235	1.958E-06	0.0054	3.882E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.963E-09	0.0000
U-238	2.638E-06	0.0073	2.088E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.722E-08	0.0002
Total	3.610E-04	0.9938	3.445E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.911E-06	0.0053

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.819E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.220E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.790E-04	0.7681
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.947E-05	0.2188
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.431E-08	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.968E-06	0.0054
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-06	0.0075
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.633E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.964E-04	0.000E+00	0.000E+00	0.000E+00	2.397E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.397E-02
Pa-231	2.013E-04	0.000E+00	0.000E+00	0.000E+00	2.457E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.457E-02
Pb-210	1.553E-01	0.000E+00	0.000E+00	0.000E+00	1.896E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.896E+01
Ra-226	1.580E-01	0.000E+00	0.000E+00	0.000E+00	1.928E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.928E+01
Th-230	2.274E-01	0.000E+00	0.000E+00	0.000E+00	2.775E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.775E+01
U-234	3.681E-02	0.000E+00	0.000E+00	0.000E+00	4.493E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.493E+00
U-235	7.446E-03	0.000E+00	0.000E+00	0.000E+00	9.087E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.087E-01
U-238	5.045E-02	0.000E+00	0.000E+00	0.000E+00	6.157E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.157E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.220E-08	0.0002	1.244E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.430E-10	0.0000
Pa-231	9.048E-09	0.0000	2.776E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.785E-10	0.0000
Pb-210	2.146E-07	0.0005	6.339E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.503E-06	0.0036
Ra-226	4.163E-04	0.9859	5.512E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.233E-07	0.0010
Th-230	6.064E-08	0.0001	1.943E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.681E-07	0.0004
U-234	3.037E-09	0.0000	1.248E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.111E-08	0.0001
U-235	1.292E-06	0.0031	2.237E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.406E-09	0.0000
U-238	1.774E-06	0.0042	1.403E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.846E-08	0.0001
Total	4.197E-04	0.9941	3.431E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.159E-06	0.0051

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.429E-08	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.604E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.781E-06	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.168E-04	0.9870
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.230E-07	0.0010
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.663E-08	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.299E-06	0.0031
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.827E-06	0.0043
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.222E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.522E-20	0.0000	4.754E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.220E-22	0.0000
Pb-210	2.401E-21	0.0000	7.095E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.682E-20	0.0000
Ra-226	2.019E-04	0.4782	5.807E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.485E-07	0.0022
Th-230	2.144E-04	0.5078	2.543E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.144E-06	0.0027
U-234	2.433E-07	0.0006	1.288E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.243E-08	0.0001
U-235	1.393E-06	0.0033	3.759E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.527E-09	0.0000
U-238	1.775E-06	0.0042	1.408E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.854E-08	0.0001
Total	4.197E-04	0.9941	3.431E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.159E-06	0.0051

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.602E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.993E-20	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.029E-04	0.4806
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.158E-04	0.5111
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.786E-07	0.0007
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.402E-06	0.0033
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.827E-06	0.0043
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.222E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	6.425E-02	0.000E+00	0.000E+00	0.000E+00	2.951E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.951E+01
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	2.379E+00	0.000E+00	0.000E+00	0.000E+00	1.093E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.093E+03
Ra-226	3.888E+00	0.000E+00	0.000E+00	0.000E+00	1.786E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.786E+03
Ra-228	5.955E-03	0.000E+00	0.000E+00	0.000E+00	2.735E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.735E+00
Th-228	1.316E-02	0.000E+00	0.000E+00	0.000E+00	6.046E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.046E+00
Th-230	3.151E+00	0.000E+00	0.000E+00	0.000E+00	1.448E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.448E+03
Th-232	3.071E-02	0.000E+00	0.000E+00	0.000E+00	1.411E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.411E+01
U-234	1.335E+00	0.000E+00	0.000E+00	0.000E+00	6.134E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.134E+02
U-235	1.439E-01	0.000E+00	0.000E+00	0.000E+00	6.608E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.608E+01
U-238	5.832E-01	0.000E+00	0.000E+00	0.000E+00	2.679E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.679E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.787E-05	0.0018	2.593E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.612E-07	0.0001
Pa-231	1.873E-09	0.0000	6.198E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.340E-10	0.0000
Pb-210	3.681E-06	0.0004	1.179E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.052E-04	0.0106
Ra-226	9.574E-03	0.9683	1.351E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.905E-05	0.0039
Ra-228	3.153E-05	0.0032	3.772E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.587E-07	0.0001
Th-228	5.082E-05	0.0051	9.660E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.511E-07	0.0000
Th-230	7.758E-07	0.0001	2.693E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.768E-06	0.0009
Th-232	3.154E-09	0.0000	3.988E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.773E-08	0.0000
U-234	1.011E-07	0.0000	4.535E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.887E-06	0.0003
U-235	2.314E-05	0.0023	4.328E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.209E-07	0.0000
U-238	1.920E-05	0.0019	1.625E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.676E-06	0.0002
Total	9.721E-03	0.9832	6.282E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.597E-04	0.0161

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.880E-05	0.0019
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.169E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.101E-04	0.0111
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.615E-03	0.9724
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.230E-05	0.0033
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.116E-05	0.0052
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.224E-05	0.0012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.442E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.350E-05	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.104E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.887E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.787E-05	0.0018	2.593E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.610E-07	0.0001
Pb-210	1.959E-06	0.0002	6.275E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.599E-05	0.0057
Ra-226	9.526E-03	0.9634	1.893E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.787E-05	0.0089
Ra-228	5.667E-06	0.0006	7.029E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.817E-08	0.0000
Th-228	2.733E-06	0.0003	5.195E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.350E-08	0.0000
Th-230	5.104E-05	0.0052	2.702E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.157E-06	0.0009
Th-232	7.395E-05	0.0075	1.280E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.026E-06	0.0001
U-234	1.030E-07	0.0000	4.537E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.888E-06	0.0003
U-235	2.314E-05	0.0023	4.342E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.213E-07	0.0000
U-238	1.920E-05	0.0019	1.625E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.676E-06	0.0002
Total	9.721E-03	0.9832	6.282E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.597E-04	0.0161

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.879E-05	0.0019
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.858E-05	0.0059
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.616E-03	0.9725
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.742E-06	0.0006
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.751E-06	0.0003
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.290E-05	0.0064
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.511E-05	0.0076
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.444E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.351E-05	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.104E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.887E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	6.223E-02	0.000E+00	0.000E+00	0.000E+00	2.859E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.859E+01
Pa-231	3.043E-06	0.000E+00	0.000E+00	0.000E+00	1.398E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.398E-03
Pb-210	2.425E+00	0.000E+00	0.000E+00	0.000E+00	1.114E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.114E+03
Ra-226	3.887E+00	0.000E+00	0.000E+00	0.000E+00	1.786E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.786E+03
Ra-228	8.766E-03	0.000E+00	0.000E+00	0.000E+00	4.027E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.027E+00
Th-228	1.143E-02	0.000E+00	0.000E+00	0.000E+00	5.252E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.252E+00
Th-230	3.151E+00	0.000E+00	0.000E+00	0.000E+00	1.448E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.448E+03
Th-232	3.071E-02	0.000E+00	0.000E+00	0.000E+00	1.411E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.411E+01
U-234	1.335E+00	0.000E+00	0.000E+00	0.000E+00	6.131E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.131E+02
U-235	1.438E-01	0.000E+00	0.000E+00	0.000E+00	6.605E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.605E+01
U-238	5.830E-01	0.000E+00	0.000E+00	0.000E+00	2.678E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.678E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.731E-05	0.0018	2.512E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.405E-07	0.0001
Pa-231	1.997E-09	0.0000	6.610E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.496E-10	0.0000
Pb-210	3.718E-06	0.0004	1.191E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.063E-04	0.0107
Ra-226	9.573E-03	0.9681	1.351E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.905E-05	0.0039
Ra-228	3.252E-05	0.0033	3.891E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.825E-07	0.0001
Th-228	5.214E-05	0.0053	9.912E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.576E-07	0.0000
Th-230	7.758E-07	0.0001	2.693E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.767E-06	0.0009
Th-232	3.154E-09	0.0000	3.988E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.773E-08	0.0000
U-234	1.010E-07	0.0000	4.533E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.886E-06	0.0003
U-235	2.313E-05	0.0023	4.326E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.207E-07	0.0000
U-238	1.919E-05	0.0019	1.624E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.675E-06	0.0002
Total	9.722E-03	0.9831	6.288E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.607E-04	0.0163

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.821E-05	0.0018
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.313E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.112E-04	0.0112
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.614E-03	0.9721
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.331E-05	0.0034
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.250E-05	0.0053
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.224E-05	0.0012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.440E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.349E-05	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.103E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.889E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.731E-05	0.0018	2.511E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.403E-07	0.0001
Pb-210	1.898E-06	0.0002	6.081E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.426E-05	0.0055
Ra-226	9.522E-03	0.9628	1.924E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.063E-05	0.0092
Ra-228	5.376E-06	0.0005	6.901E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.217E-08	0.0000
Th-228	1.902E-06	0.0002	3.616E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.397E-09	0.0000
Th-230	5.438E-05	0.0055	2.703E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.188E-06	0.0009
Th-232	7.739E-05	0.0078	1.324E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.066E-06	0.0001
U-234	1.032E-07	0.0000	4.535E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.886E-06	0.0003
U-235	2.313E-05	0.0023	4.341E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.212E-07	0.0000
U-238	1.919E-05	0.0019	1.624E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.675E-06	0.0002
Total	9.722E-03	0.9831	6.288E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.607E-04	0.0163

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.820E-05	0.0018
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.677E-05	0.0057
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.614E-03	0.9722
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.445E-06	0.0006
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.915E-06	0.0002
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.628E-05	0.0067
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.859E-05	0.0079
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.443E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.350E-05	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.103E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.889E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	5.838E-02	0.000E+00	0.000E+00	0.000E+00	2.682E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.682E+01
Pa-231	9.123E-06	0.000E+00	0.000E+00	0.000E+00	4.191E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.191E-03
Pb-210	2.511E+00	0.000E+00	0.000E+00	0.000E+00	1.154E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.154E+03
Ra-226	3.887E+00	0.000E+00	0.000E+00	0.000E+00	1.785E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.785E+03
Ra-228	1.347E-02	0.000E+00	0.000E+00	0.000E+00	6.186E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.186E+00
Th-228	1.146E-02	0.000E+00	0.000E+00	0.000E+00	5.266E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.266E+00
Th-230	3.151E+00	0.000E+00	0.000E+00	0.000E+00	1.447E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.447E+03
Th-232	3.071E-02	0.000E+00	0.000E+00	0.000E+00	1.411E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.411E+01
U-234	1.334E+00	0.000E+00	0.000E+00	0.000E+00	6.126E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.126E+02
U-235	1.437E-01	0.000E+00	0.000E+00	0.000E+00	6.599E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.599E+01
U-238	5.824E-01	0.000E+00	0.000E+00	0.000E+00	2.675E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.675E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.625E-05	0.0016	2.357E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.009E-07	0.0001
Pa-231	2.246E-09	0.0000	7.433E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.807E-10	0.0000
Pb-210	3.789E-06	0.0004	1.214E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.083E-04	0.0109
Ra-226	9.571E-03	0.9675	1.351E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.904E-05	0.0039
Ra-228	3.418E-05	0.0035	4.089E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.224E-07	0.0001
Th-228	5.496E-05	0.0056	1.045E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.715E-07	0.0000
Th-230	7.758E-07	0.0001	2.693E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.767E-06	0.0009
Th-232	3.154E-09	0.0000	3.988E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.772E-08	0.0000
U-234	1.009E-07	0.0000	4.529E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.883E-06	0.0003
U-235	2.311E-05	0.0023	4.322E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.204E-07	0.0000
U-238	1.918E-05	0.0019	1.622E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.674E-06	0.0002
Total	9.724E-03	0.9829	6.299E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.628E-04	0.0165

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.708E-05	0.0017
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.601E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.133E-04	0.0115
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.612E-03	0.9716
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.501E-05	0.0035
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.533E-05	0.0056
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.224E-05	0.0012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.437E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.347E-05	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.101E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.893E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.624E-05	0.0016	2.356E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.007E-07	0.0001
Pb-210	1.783E-06	0.0002	5.711E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.096E-05	0.0052
Ra-226	9.513E-03	0.9616	1.982E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.588E-05	0.0097
Ra-228	4.612E-06	0.0005	6.161E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.077E-08	0.0000
Th-228	9.215E-07	0.0001	1.752E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.553E-09	0.0000
Th-230	6.106E-05	0.0062	2.704E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.253E-06	0.0009
Th-232	8.361E-05	0.0085	1.405E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.136E-06	0.0001
U-234	1.035E-07	0.0000	4.531E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.884E-06	0.0003
U-235	2.311E-05	0.0023	4.339E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.209E-07	0.0000
U-238	1.918E-05	0.0019	1.622E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.674E-06	0.0002
Total	9.724E-03	0.9829	6.299E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.628E-04	0.0165

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.708E-05	0.0017
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.331E-05	0.0054
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.611E-03	0.9715
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.669E-06	0.0005
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.278E-07	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.302E-05	0.0074
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.489E-05	0.0086
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.440E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.348E-05	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.101E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.893E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.670E-02	0.000E+00	0.000E+00	0.000E+00	2.145E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.145E+01
Pa-231	3.035E-05	0.000E+00	0.000E+00	0.000E+00	1.394E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.394E-02
Pb-210	2.775E+00	0.000E+00	0.000E+00	0.000E+00	1.275E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.275E+03
Ra-226	3.884E+00	0.000E+00	0.000E+00	0.000E+00	1.784E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.784E+03
Ra-228	2.329E-02	0.000E+00	0.000E+00	0.000E+00	1.070E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.070E+01
Th-228	2.012E-02	0.000E+00	0.000E+00	0.000E+00	9.240E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.240E+00
Th-230	3.150E+00	0.000E+00	0.000E+00	0.000E+00	1.447E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.447E+03
Th-232	3.070E-02	0.000E+00	0.000E+00	0.000E+00	1.410E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.410E+01
U-234	1.329E+00	0.000E+00	0.000E+00	0.000E+00	6.106E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.106E+02
U-235	1.432E-01	0.000E+00	0.000E+00	0.000E+00	6.577E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.577E+01
U-238	5.805E-01	0.000E+00	0.000E+00	0.000E+00	2.667E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.667E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.300E-05	0.0013	1.886E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.809E-07	0.0000
Pa-231	3.114E-09	0.0000	1.031E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.892E-10	0.0000
Pb-210	4.005E-06	0.0004	1.283E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.145E-04	0.0116
Ra-226	9.565E-03	0.9661	1.350E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.901E-05	0.0039
Ra-228	3.764E-05	0.0038	4.503E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.057E-07	0.0001
Th-228	6.263E-05	0.0063	1.191E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.094E-07	0.0000
Th-230	7.756E-07	0.0001	2.692E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.765E-06	0.0009
Th-232	3.153E-09	0.0000	3.987E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.770E-08	0.0000
U-234	1.006E-07	0.0000	4.514E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.874E-06	0.0003
U-235	2.303E-05	0.0023	4.308E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.194E-07	0.0000
U-238	1.911E-05	0.0019	1.617E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.668E-06	0.0002
Total	9.725E-03	0.9823	6.333E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.689E-04	0.0171

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.367E-05	0.0014
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.607E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.198E-04	0.0121
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.605E-03	0.9702
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.855E-05	0.0039
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.306E-05	0.0064
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.223E-05	0.0012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.407E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.426E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.339E-05	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.094E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.900E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0
Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.299E-05	0.0013	1.884E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.805E-07	0.0000
Pb-210	1.431E-06	0.0001	4.585E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.091E-05	0.0041
Ra-226	9.484E-03	0.9579	2.158E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.118E-04	0.0113
Ra-228	2.202E-06	0.0002	3.066E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.291E-08	0.0000
Th-228	7.294E-08	0.0000	1.387E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.603E-10	0.0000
Th-230	8.439E-05	0.0085	2.708E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.507E-06	0.0010
Th-232	9.800E-05	0.0099	1.602E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.290E-06	0.0001
U-234	1.051E-07	0.0000	4.516E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.875E-06	0.0003
U-235	2.304E-05	0.0023	4.334E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.202E-07	0.0000
U-238	1.911E-05	0.0019	1.617E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.668E-06	0.0002
Total	9.725E-03	0.9823	6.333E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.689E-04	0.0171

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-05	0.0014
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.280E-05	0.0043
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.598E-03	0.9694
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.228E-06	0.0002
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.344E-08	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.661E-05	0.0098
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.945E-05	0.0100
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.431E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.341E-05	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.094E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.900E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.470E-02	0.000E+00	0.000E+00	0.000E+00	1.135E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.135E+01
Pa-231	9.056E-05	0.000E+00	0.000E+00	0.000E+00	4.160E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.160E-02
Pb-210	3.273E+00	0.000E+00	0.000E+00	0.000E+00	1.503E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.503E+03
Ra-226	3.876E+00	0.000E+00	0.000E+00	0.000E+00	1.781E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.781E+03
Ra-228	3.002E-02	0.000E+00	0.000E+00	0.000E+00	1.379E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.379E+01
Th-228	2.969E-02	0.000E+00	0.000E+00	0.000E+00	1.364E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.364E+01
Th-230	3.148E+00	0.000E+00	0.000E+00	0.000E+00	1.446E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.446E+03
Th-232	3.069E-02	0.000E+00	0.000E+00	0.000E+00	1.410E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.410E+01
U-234	1.317E+00	0.000E+00	0.000E+00	0.000E+00	6.049E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.049E+02
U-235	1.419E-01	0.000E+00	0.000E+00	0.000E+00	6.516E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.516E+01
U-238	5.751E-01	0.000E+00	0.000E+00	0.000E+00	2.642E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.642E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	6.890E-06	0.0007	9.996E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.549E-07	0.0000
Pa-231	5.577E-09	0.0000	1.846E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.970E-10	0.0000
Pb-210	4.411E-06	0.0004	1.413E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.261E-04	0.0127
Ra-226	9.546E-03	0.9647	1.347E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.894E-05	0.0039
Ra-228	4.000E-05	0.0040	4.785E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.625E-07	0.0001
Th-228	6.862E-05	0.0069	1.305E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.390E-07	0.0000
Th-230	7.751E-07	0.0001	2.690E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.759E-06	0.0009
Th-232	3.151E-09	0.0000	3.985E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.765E-08	0.0000
U-234	9.966E-08	0.0000	4.472E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.847E-06	0.0003
U-235	2.282E-05	0.0023	4.268E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.164E-07	0.0000
U-238	1.894E-05	0.0019	1.602E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.653E-06	0.0002
Total	9.708E-03	0.9811	6.375E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.802E-04	0.0182

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.245E-06	0.0007
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.459E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.319E-04	0.0133
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.586E-03	0.9688
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.097E-05	0.0041
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.909E-05	0.0070
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.222E-05	0.0012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.406E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.394E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.317E-05	0.0023
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.075E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.895E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.862E-06	0.0007	9.956E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.538E-07	0.0000
Pb-210	7.642E-07	0.0001	2.448E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.184E-05	0.0022
Ra-226	9.400E-03	0.9499	2.482E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.415E-04	0.0143
Ra-228	2.020E-07	0.0000	2.834E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.077E-09	0.0000
Th-228	5.196E-11	0.0000	9.878E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.567E-13	0.0000
Th-230	1.506E-04	0.0152	2.723E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.040E-05	0.0011
Th-232	1.084E-04	0.0110	1.748E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.397E-06	0.0001
U-234	1.131E-07	0.0000	4.476E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.848E-06	0.0003
U-235	2.285E-05	0.0023	4.327E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.181E-07	0.0000
U-238	1.894E-05	0.0019	1.602E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.653E-06	0.0002
Total	9.708E-03	0.9811	6.375E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.802E-04	0.0182

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.216E-06	0.0007
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.285E-05	0.0023
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.544E-03	0.9645
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.043E-07	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.232E-11	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.637E-04	0.0165
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.100E-04	0.0111
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.409E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.321E-05	0.0023
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.075E-05	0.0021
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.895E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.852E-03	0.000E+00	0.000E+00	0.000E+00	1.310E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.310E+00
Pa-231	2.962E-04	0.000E+00	0.000E+00	0.000E+00	1.360E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.360E-01
Pb-210	3.761E+00	0.000E+00	0.000E+00	0.000E+00	1.728E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.728E+03
Ra-226	3.850E+00	0.000E+00	0.000E+00	0.000E+00	1.768E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.768E+03
Ra-228	3.063E-02	0.000E+00	0.000E+00	0.000E+00	1.407E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.407E+01
Th-228	3.063E-02	0.000E+00	0.000E+00	0.000E+00	1.407E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.407E+01
Th-230	3.141E+00	0.000E+00	0.000E+00	0.000E+00	1.443E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.443E+03
Th-232	3.063E-02	0.000E+00	0.000E+00	0.000E+00	1.407E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.407E+01
U-234	1.274E+00	0.000E+00	0.000E+00	0.000E+00	5.854E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.854E+02
U-235	1.373E-01	0.000E+00	0.000E+00	0.000E+00	6.307E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.307E+01
U-238	5.566E-01	0.000E+00	0.000E+00	0.000E+00	2.557E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.557E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	8.436E-07	0.0001	1.224E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.120E-08	0.0000
Pa-231	1.399E-08	0.0000	4.629E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.748E-09	0.0000
Pb-210	4.801E-06	0.0005	1.538E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-04	0.0140
Ra-226	9.480E-03	0.9641	1.338E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.867E-05	0.0039
Ra-228	4.016E-05	0.0041	4.804E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.662E-07	0.0001
Th-228	6.909E-05	0.0070	1.313E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.413E-07	0.0000
Th-230	7.732E-07	0.0001	2.684E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.738E-06	0.0009
Th-232	3.145E-09	0.0000	3.977E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.746E-08	0.0000
U-234	9.645E-08	0.0000	4.328E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.755E-06	0.0003
U-235	2.208E-05	0.0022	4.131E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.062E-07	0.0000
U-238	1.833E-05	0.0019	1.551E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.600E-06	0.0002
Total	9.637E-03	0.9800	6.377E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.907E-04	0.0194

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.870E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.620E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.436E-04	0.0146
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.520E-03	0.9681
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.113E-05	0.0042
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.956E-05	0.0071
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.220E-05	0.0012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.404E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.284E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.243E-05	0.0023
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.008E-05	0.0020
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.834E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	7.355E-07	0.0001	1.067E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.721E-08	0.0000
Pb-210	8.496E-08	0.0000	2.721E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.428E-06	0.0002
Ra-226	9.108E-03	0.9262	2.750E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.679E-04	0.0171
Ra-228	4.366E-11	0.0000	6.126E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.490E-13	0.0000
Th-228	5.014E-22	0.0000	9.532E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.477E-24	0.0000
Th-230	3.774E-04	0.0384	2.781E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.430E-05	0.0015
Th-232	1.093E-04	0.0111	1.759E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.405E-06	0.0001
U-234	1.791E-07	0.0000	4.339E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.760E-06	0.0003
U-235	2.220E-05	0.0023	4.334E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.120E-07	0.0000
U-238	1.833E-05	0.0019	1.551E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.600E-06	0.0002
Total	9.637E-03	0.9800	6.377E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.907E-04	0.0194

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.734E-07	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.541E-06	0.0003
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.279E-03	0.9436
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.417E-11	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.048E-22	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.945E-04	0.0401
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.108E-04	0.0113
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.373E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.256E-05	0.0023
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.008E-05	0.0020
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.834E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	7.621E-04	0.000E+00	0.000E+00	0.000E+00	3.501E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.501E-01
Pa-231	8.415E-04	0.000E+00	0.000E+00	0.000E+00	3.865E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.865E-01
Pb-210	3.752E+00	0.000E+00	0.000E+00	0.000E+00	1.724E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.724E+03
Ra-226	3.777E+00	0.000E+00	0.000E+00	0.000E+00	1.735E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.735E+03
Ra-228	3.046E-02	0.000E+00	0.000E+00	0.000E+00	1.399E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.399E+01
Th-228	3.046E-02	0.000E+00	0.000E+00	0.000E+00	1.399E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.399E+01
Th-230	3.120E+00	0.000E+00	0.000E+00	0.000E+00	1.433E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.433E+03
Th-232	3.045E-02	0.000E+00	0.000E+00	0.000E+00	1.399E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.399E+01
U-234	1.160E+00	0.000E+00	0.000E+00	0.000E+00	5.330E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.330E+02
U-235	1.251E-01	0.000E+00	0.000E+00	0.000E+00	5.745E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.745E+01
U-238	5.070E-01	0.000E+00	0.000E+00	0.000E+00	2.329E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.329E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.455E-07	0.0000	5.013E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.278E-08	0.0000
Pa-231	3.629E-08	0.0000	1.201E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.535E-09	0.0000
Pb-210	4.762E-06	0.0005	1.525E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.361E-04	0.0141
Ra-226	9.302E-03	0.9641	1.312E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.794E-05	0.0039
Ra-228	3.993E-05	0.0041	4.777E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.608E-07	0.0001
Th-228	6.870E-05	0.0071	1.306E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.394E-07	0.0000
Th-230	7.681E-07	0.0001	2.666E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.680E-06	0.0009
Th-232	3.128E-09	0.0000	3.954E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.691E-08	0.0000
U-234	8.783E-08	0.0000	3.941E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.509E-06	0.0003
U-235	2.011E-05	0.0021	3.763E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.790E-07	0.0000
U-238	1.669E-05	0.0017	1.412E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.457E-06	0.0002
Total	9.453E-03	0.9798	6.258E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.884E-04	0.0195

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.633E-07	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.203E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.424E-04	0.0148
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.341E-03	0.9682
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.090E-05	0.0042
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.917E-05	0.0072
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.211E-05	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.396E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.991E-06	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.043E-05	0.0021
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.829E-05	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.648E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.246E-09	0.0000	1.808E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.609E-11	0.0000
Pb-210	1.598E-10	0.0000	5.119E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.568E-09	0.0000
Ra-226	8.323E-03	0.8627	2.554E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.570E-04	0.0163
Ra-228	1.472E-21	0.0000	2.066E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.514E-23	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	9.840E-04	0.1020	2.947E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.565E-05	0.0027
Th-232	1.086E-04	0.0113	1.749E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.397E-06	0.0001
U-234	6.658E-07	0.0001	3.971E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.527E-06	0.0003
U-235	2.050E-05	0.0021	4.383E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.962E-07	0.0000
U-238	1.670E-05	0.0017	1.414E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.458E-06	0.0002
Total	9.453E-03	0.9798	6.258E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.884E-04	0.0195

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.310E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.779E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.482E-03	0.8792
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.490E-21	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.013E-03	0.1050
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.102E-04	0.0114
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.590E-06	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.084E-05	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.829E-05	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.648E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.268E-03	0.000E+00	0.000E+00	0.000E+00	1.042E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.042E+00
Pa-231	2.328E-03	0.000E+00	0.000E+00	0.000E+00	1.069E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.069E+00
Pb-210	3.530E+00	0.000E+00	0.000E+00	0.000E+00	1.622E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.622E+03
Ra-226	3.555E+00	0.000E+00	0.000E+00	0.000E+00	1.633E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.633E+03
Ra-228	2.986E-02	0.000E+00	0.000E+00	0.000E+00	1.372E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.372E+01
Th-228	2.986E-02	0.000E+00	0.000E+00	0.000E+00	1.372E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.372E+01
Th-230	3.046E+00	0.000E+00	0.000E+00	0.000E+00	1.399E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.399E+03
Th-232	2.986E-02	0.000E+00	0.000E+00	0.000E+00	1.372E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.372E+01
U-234	8.361E-01	0.000E+00	0.000E+00	0.000E+00	3.841E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.841E+02
U-235	9.021E-02	0.000E+00	0.000E+00	0.000E+00	4.144E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.144E+01
U-238	3.657E-01	0.000E+00	0.000E+00	0.000E+00	1.680E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.680E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.916E-07	0.0001	1.439E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.668E-08	0.0000
Pa-231	9.708E-08	0.0000	3.213E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.213E-08	0.0000
Pb-210	4.482E-06	0.0005	1.436E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-04	0.0141
Ra-226	8.757E-03	0.9645	1.236E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.572E-05	0.0039
Ra-228	3.915E-05	0.0043	4.683E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.420E-07	0.0001
Th-228	6.736E-05	0.0074	1.281E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.328E-07	0.0000
Th-230	7.498E-07	0.0001	2.603E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.474E-06	0.0009
Th-232	3.066E-09	0.0000	3.877E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.502E-08	0.0000
U-234	6.328E-08	0.0000	2.839E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.808E-06	0.0002
U-235	1.451E-05	0.0016	2.714E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.012E-07	0.0000
U-238	1.204E-05	0.0013	1.019E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.051E-06	0.0001
Total	8.897E-03	0.9799	5.876E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.768E-04	0.0195

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-06	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.124E-07	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.340E-04	0.0148
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.794E-03	0.9686
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.010E-05	0.0044
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.782E-05	0.0075
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.183E-05	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.369E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.155E-06	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.474E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.320E-05	0.0015
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.080E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.493E-19	0.0000	3.617E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.222E-21	0.0000
Pb-210	4.613E-20	0.0000	1.477E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.318E-18	0.0000
Ra-226	6.069E-03	0.6684	1.862E-06	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.145E-04	0.0126
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.689E-03	0.2962	3.402E-06	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.765E-05	0.0063
Th-232	1.065E-04	0.0117	1.715E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.370E-06	0.0002
U-234	4.878E-06	0.0005	2.931E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.918E-06	0.0002
U-235	1.560E-05	0.0017	4.474E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.500E-07	0.0000
U-238	1.204E-05	0.0013	1.022E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.053E-06	0.0001
Total	8.897E-03	0.9799	5.876E-06	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.768E-04	0.0195

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.621E-19	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.379E-18	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.185E-03	0.6812
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.750E-03	0.3029
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.081E-04	0.0119
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.089E-06	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.589E-05	0.0018
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.320E-05	0.0015
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.080E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(1,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(2,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(1,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(2,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(1,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(2,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(1,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(2,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(1,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(2,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	4.068E-02	0.000E+00	0.000E+00	0.000E+00	3.163E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.163E+01
Ra-226	4.068E-02	0.000E+00	0.000E+00	0.000E+00	3.163E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.163E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0 Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	4.916E-08	0.0005	1.648E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.489E-06	0.0253
Ra-226	9.514E-05	0.9669	1.406E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.881E-07	0.0070
Total	9.519E-05	0.9674	3.054E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.177E-06	0.0323

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

	Water		Fish		Plant		Meat		Milk		All Pathways**	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.555E-06	0.0260
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.584E-05	0.9740
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.839E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	3.201E-08	0.0003	1.073E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.621E-06	0.0165
Ra-226	9.515E-05	0.9671	1.981E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.556E-06	0.0158
Total	9.519E-05	0.9674	3.054E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.177E-06	0.0323

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.664E-06	0.0169
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.673E-05	0.9831
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.839E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	4.066E-02	0.000E+00	0.000E+00	0.000E+00	3.162E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.162E+01
Ra-226	4.066E-02	0.000E+00	0.000E+00	0.000E+00	3.162E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.162E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	4.914E-08	0.0005	1.647E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.488E-06	0.0253
Ra-226	9.509E-05	0.9669	1.405E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.878E-07	0.0070
Total	9.514E-05	0.9674	3.052E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.176E-06	0.0323

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.554E-06	0.0260
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.580E-05	0.9740
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.835E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	3.102E-08	0.0003	1.040E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.571E-06	0.0160
Ra-226	9.511E-05	0.9671	2.013E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.605E-06	0.0163
Total	9.514E-05	0.9674	3.052E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.176E-06	0.0323

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.612E-06	0.0164
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.674E-05	0.9836
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.835E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	4.064E-02	0.000E+00	0.000E+00	0.000E+00	3.161E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.161E+01
Ra-226	4.062E-02	0.000E+00	0.000E+00	0.000E+00	3.159E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.159E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	4.911E-08	0.0005	1.646E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.486E-06	0.0253
Ra-226	9.501E-05	0.9669	1.404E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.872E-07	0.0070
Total	9.506E-05	0.9674	3.050E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.174E-06	0.0323

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.552E-06	0.0260
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.571E-05	0.9740
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.826E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	2.914E-08	0.0003	9.765E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.475E-06	0.0150
Ra-226	9.503E-05	0.9671	2.073E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.698E-06	0.0173
Total	9.506E-05	0.9674	3.050E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.174E-06	0.0323

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.514E-06	0.0154
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.675E-05	0.9846
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.826E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	4.055E-02	0.000E+00	0.000E+00	0.000E+00	3.153E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.153E+01
Ra-226	4.049E-02	0.000E+00	0.000E+00	0.000E+00	3.149E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.149E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	4.898E-08	0.0005	1.642E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.480E-06	0.0253
Ra-226	9.471E-05	0.9669	1.400E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.850E-07	0.0070
Total	9.476E-05	0.9674	3.041E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.165E-06	0.0323

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                 Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
                                 and Fraction of Total Risk at t= 1.000E+01 years

                                              Water Dependent Pathways

              Water              Fish              Plant              Meat              Milk          All Pathways**
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide    risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.
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 Pb-210  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  2.545E-06 0.0260
 Ra-226  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  9.541E-05 0.9740
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 Total   0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  9.795E-05 1.0000

 ** Sum of water independent ground, inhalation, plant, meat, milk, soil
    and water dependent water, fish, plant, meat, milk pathways
0
              Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
                          Radon and its Decay Products at t= 1.000E+01 years
0                                                    Radionuclides
   Radon     ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
   Pathway     Rn-222     Po-218     Pb-214     Bi-214     Rn-220     Po-216     Pb-212     Bi-212
 ÄÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
  Water-ind.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
  Water-dep.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
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  Total       0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00

  Water-ind. == Water-independent    Water-dep. == Water-dependent
0
                 Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
                                         and Fraction of Total Risk at t= 1.000E+01 years
0                                      Water Independent Pathways (Inhalation excludes radon)
0            Ground          Inhalation          Radon             Plant              Meat              Milk              Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide    risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
 Pb-210  2.339E-08 0.0002  7.839E-09 0.0001  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.184E-06 0.0121
 Ra-226  9.473E-05 0.9671  2.257E-08 0.0002  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.981E-06 0.0202
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 Total   9.476E-05 0.9674  3.041E-08 0.0003  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  3.165E-06 0.0323
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                 Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
                                         and Fraction of Total Risk at t= 1.000E+01 years

                                              Water Dependent Pathways

              Water              Fish              Radon             Plant              Meat              Milk          All pathways
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide    risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.     risk   fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
 Pb-210  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  1.215E-06 0.0124
 Ra-226  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  9.674E-05 0.9876
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 Total   0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  9.795E-05 1.0000

 ***CNRSI(i,p,t) includes contribution from decay daughter radionuclides
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                      Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
                                                  As pCi/yr at t= 3.000E+01 years

           Water Independent Pathways (Inhalation w/o radon)                    Water Dependent Pathways
 Radio-   ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ   Total
 Nuclide  Inhalation   Plant       Meat       Milk       Soil       Water       Fish       Plant       Meat       Milk     Ingestion*
 ÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
 Pb-210    4.025E-02  0.000E+00  0.000E+00  0.000E+00  3.130E+01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  3.130E+01
 Ra-226    4.013E-02  0.000E+00  0.000E+00  0.000E+00  3.121E+01  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  3.121E+01
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 * Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
   and water-dependent water, fish, plant, meat, milk pathways
0
           Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
                      Radon and its Decay Products as pCi/yr at t= 3.000E+01 years
0                                                    Radionuclides
   Radon     ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
   Pathway     Rn-222     Po-218     Pb-214     Bi-214     Rn-220     Po-216     Pb-212     Bi-212
 ÄÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
  Water-ind.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
  Water-dep.  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00
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  Total       0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00  0.000E+00

  Water-ind. == Water-independent    Water-dep. == Water-dependent
```

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	4.859E-08	0.0005	1.629E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.460E-06	0.0253
Ra-226	9.386E-05	0.9669	1.387E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.789E-07	0.0070
Total	9.391E-05	0.9674	3.016E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.139E-06	0.0323

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.525E-06	0.0260
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.455E-05	0.9740
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.708E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.249E-08	0.0001	4.185E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.322E-07	0.0065
Ra-226	9.389E-05	0.9672	2.597E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.507E-06	0.0258
Total	9.391E-05	0.9674	3.016E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.139E-06	0.0323

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.489E-07	0.0067
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.643E-05	0.9933
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.708E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	3.907E-02	0.000E+00	0.000E+00	0.000E+00	3.038E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.038E+01
Ra-226	3.888E-02	0.000E+00	0.000E+00	0.000E+00	3.024E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.024E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	4.714E-08	0.0005	1.580E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.387E-06	0.0254
Ra-226	9.094E-05	0.9668	1.344E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.578E-07	0.0070
Total	9.099E-05	0.9673	2.924E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.044E-06	0.0324

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.450E-06	0.0260
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.161E-05	0.9740
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.406E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.388E-09	0.0000	4.653E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.029E-08	0.0007
Ra-226	9.099E-05	0.9673	2.877E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.974E-06	0.0316
Total	9.099E-05	0.9673	2.924E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.044E-06	0.0324

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.215E-08	0.0008
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.399E-05	0.9992
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.406E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	3.570E-02	0.000E+00	0.000E+00	0.000E+00	2.777E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.777E+01
Ra-226	3.553E-02	0.000E+00	0.000E+00	0.000E+00	2.763E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.763E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	4.308E-08	0.0005	1.444E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.181E-06	0.0254
Ra-226	8.309E-05	0.9668	1.228E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.010E-07	0.0070
Total	8.314E-05	0.9673	2.672E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.782E-06	0.0324

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.239E-06	0.0260
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.371E-05	0.9740
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.595E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	2.611E-12	0.0000	8.752E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.322E-10	0.0000
Ra-226	8.314E-05	0.9673	2.672E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.782E-06	0.0324
Total	8.314E-05	0.9673	2.672E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.782E-06	0.0324

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.357E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.595E-05	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.595E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	2.604E-02	0.000E+00	0.000E+00	0.000E+00	2.025E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.025E+01
Ra-226	2.591E-02	0.000E+00	0.000E+00	0.000E+00	2.015E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.015E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	3.141E-08	0.0005	1.053E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.590E-06	0.0254
Ra-226	6.059E-05	0.9668	8.955E-09	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.383E-07	0.0070
Total	6.062E-05	0.9673	1.948E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.029E-06	0.0324

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.632E-06	0.0260
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.104E-05	0.9740
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.267E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	7.537E-22	0.0000	2.526E-22	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.816E-20	0.0000
Ra-226	6.062E-05	0.9673	1.948E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.029E-06	0.0324
Total	6.062E-05	0.9673	1.948E-08	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.029E-06	0.0324

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.917E-20	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.267E-05	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.267E-05	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents
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Part III: Intake Quantities and Health Risk Factors
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Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0

Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	4.174E-01	0.000E+00	0.000E+00	0.000E+00	1.082E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.082E+02
Ra-226	4.174E-01	0.000E+00	0.000E+00	0.000E+00	1.082E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.082E+02
Ra-228	2.343E-03	0.000E+00	0.000E+00	0.000E+00	6.072E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.072E-01
Th-228	2.109E-02	0.000E+00	0.000E+00	0.000E+00	5.465E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.465E+00
Th-230	3.881E-01	0.000E+00	0.000E+00	0.000E+00	1.006E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.006E+02
Th-232	6.561E-02	0.000E+00	0.000E+00	0.000E+00	1.700E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.700E+01
U-234	2.446E-01	0.000E+00	0.000E+00	0.000E+00	6.337E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.337E+01
U-235	2.870E-02	0.000E+00	0.000E+00	0.000E+00	7.438E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.438E+00
U-238	1.459E-01	0.000E+00	0.000E+00	0.000E+00	3.780E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.780E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.028E-09	0.0000	1.433E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.061E-11	0.0000
Pa-231	3.843E-10	0.0000	1.221E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.601E-11	0.0000
Pb-210	5.460E-07	0.0004	1.679E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.454E-06	0.0067
Ra-226	1.065E-03	0.8456	1.450E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.365E-06	0.0019
Ra-228	6.592E-05	0.0524	7.611E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.636E-07	0.0007
Th-228	1.038E-04	0.0825	1.916E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.808E-07	0.0002
Th-230	9.968E-08	0.0001	3.313E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.085E-07	0.0005
Th-232	7.036E-09	0.0000	8.510E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.176E-07	0.0001
U-234	1.904E-08	0.0000	8.168E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.934E-07	0.0002
U-235	4.732E-06	0.0038	8.493E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.552E-08	0.0000
U-238	4.902E-06	0.0039	3.996E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.325E-07	0.0002
Total	1.245E-03	0.9886	1.059E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.325E-05	0.0105

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.063E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.225E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.168E-06	0.0073
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.067E-03	0.8476
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.680E-05	0.0530
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.043E-04	0.0828
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.040E-06	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.098E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.941E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.776E-06	0.0038
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.174E-06	0.0041
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.259E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	3.547E-07	0.0003	1.091E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.492E-06	0.0044
Ra-226	1.059E-03	0.8407	2.028E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.300E-06	0.0042
Ra-228	2.301E-06	0.0018	2.765E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.513E-08	0.0000
Th-228	4.510E-06	0.0036	8.321E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.220E-08	0.0000
Th-230	6.506E-06	0.0052	3.324E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.355E-07	0.0005
Th-232	1.630E-04	0.1294	2.732E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.235E-06	0.0010
U-234	1.941E-08	0.0000	8.171E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.934E-07	0.0002
U-235	4.733E-06	0.0038	8.520E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.557E-08	0.0000
U-238	4.902E-06	0.0039	3.996E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.326E-07	0.0002
Total	1.245E-03	0.9886	1.059E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.325E-05	0.0105

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.955E-06	0.0047
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.064E-03	0.8451
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.319E-06	0.0018
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.530E-06	0.0036
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.474E-06	0.0059
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.645E-04	0.1306
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.945E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.777E-06	0.0038
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.174E-06	0.0041
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.259E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	9.559E-09	0.000E+00	0.000E+00	0.000E+00	2.477E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.477E-06
Pa-231	6.068E-07	0.000E+00	0.000E+00	0.000E+00	1.572E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.572E-04
Pb-210	4.170E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.080E+02
Ra-226	4.173E-01	0.000E+00	0.000E+00	0.000E+00	1.081E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.081E+02
Ra-228	9.527E-03	0.000E+00	0.000E+00	0.000E+00	2.469E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.469E+00
Th-228	1.657E-02	0.000E+00	0.000E+00	0.000E+00	4.294E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.294E+00
Th-230	3.880E-01	0.000E+00	0.000E+00	0.000E+00	1.006E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.006E+02
Th-232	6.560E-02	0.000E+00	0.000E+00	0.000E+00	1.700E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.700E+01
U-234	2.442E-01	0.000E+00	0.000E+00	0.000E+00	6.327E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.327E+01
U-235	2.866E-02	0.000E+00	0.000E+00	0.000E+00	7.426E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.426E+00
U-238	1.456E-01	0.000E+00	0.000E+00	0.000E+00	3.774E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.774E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.126E-09	0.0000	1.569E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.257E-11	0.0000
Pa-231	4.096E-10	0.0000	1.302E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.773E-11	0.0000
Pb-210	5.456E-07	0.0004	1.678E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.448E-06	0.0067
Ra-226	1.065E-03	0.8415	1.450E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.365E-06	0.0019
Ra-228	6.855E-05	0.0542	7.914E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.979E-07	0.0007
Th-228	1.073E-04	0.0848	1.979E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.902E-07	0.0002
Th-230	9.967E-08	0.0001	3.313E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.085E-07	0.0005
Th-232	7.035E-09	0.0000	8.509E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.176E-07	0.0001
U-234	1.901E-08	0.0000	8.155E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.929E-07	0.0002
U-235	4.724E-06	0.0037	8.480E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.546E-08	0.0000
U-238	4.894E-06	0.0039	3.989E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.322E-07	0.0002
Total	1.251E-03	0.9887	1.065E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.329E-05	0.0105

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.164E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.504E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.161E-06	0.0072
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.067E-03	0.8435
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.945E-05	0.0549
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.078E-04	0.0852
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.039E-06	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.098E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.935E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.768E-06	0.0038
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.166E-06	0.0041
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.265E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	3.435E-07	0.0003	1.056E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.318E-06	0.0042
Ra-226	1.058E-03	0.8363	2.060E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.466E-06	0.0043
Ra-228	2.182E-06	0.0017	2.714E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.380E-08	0.0000
Th-228	3.139E-06	0.0025	5.792E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.491E-09	0.0000
Th-230	6.931E-06	0.0055	3.325E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.376E-07	0.0005
Th-232	1.705E-04	0.1348	2.824E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.283E-06	0.0010
U-234	1.941E-08	0.0000	8.158E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.929E-07	0.0002
U-235	4.726E-06	0.0037	8.509E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.551E-08	0.0000
U-238	4.894E-06	0.0039	3.989E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.322E-07	0.0002
Total	1.251E-03	0.9887	1.065E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.329E-05	0.0105

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.767E-06	0.0046
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.064E-03	0.8408
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.199E-06	0.0017
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.153E-06	0.0025
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.902E-06	0.0062
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.721E-04	0.1360
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.939E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.770E-06	0.0038
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.166E-06	0.0041
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.265E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	8.413E-08	0.000E+00	0.000E+00	0.000E+00	2.180E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.180E-05
Pa-231	1.817E-06	0.000E+00	0.000E+00	0.000E+00	4.708E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.708E-04
Pb-210	4.162E-01	0.000E+00	0.000E+00	0.000E+00	1.078E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.078E+02
Ra-226	4.173E-01	0.000E+00	0.000E+00	0.000E+00	1.081E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.081E+02
Ra-228	2.154E-02	0.000E+00	0.000E+00	0.000E+00	5.581E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.581E+00
Th-228	1.653E-02	0.000E+00	0.000E+00	0.000E+00	4.282E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.282E+00
Th-230	3.880E-01	0.000E+00	0.000E+00	0.000E+00	1.005E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.005E+02
Th-232	6.559E-02	0.000E+00	0.000E+00	0.000E+00	1.700E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.700E+01
U-234	2.434E-01	0.000E+00	0.000E+00	0.000E+00	6.307E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.307E+01
U-235	2.857E-02	0.000E+00	0.000E+00	0.000E+00	7.403E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.403E+00
U-238	1.452E-01	0.000E+00	0.000E+00	0.000E+00	3.762E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.762E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.337E-09	0.0000	1.864E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.680E-11	0.0000
Pa-231	4.602E-10	0.0000	1.463E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.115E-11	0.0000
Pb-210	5.449E-07	0.0004	1.676E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.437E-06	0.0066
Ra-226	1.065E-03	0.8337	1.450E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.365E-06	0.0019
Ra-228	7.293E-05	0.0571	8.419E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.553E-07	0.0007
Th-228	1.147E-04	0.0898	2.115E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.101E-07	0.0002
Th-230	9.965E-08	0.0001	3.312E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.083E-07	0.0005
Th-232	7.034E-09	0.0000	8.508E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.176E-07	0.0001
U-234	1.895E-08	0.0000	8.129E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.920E-07	0.0002
U-235	4.709E-06	0.0037	8.453E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.535E-08	0.0000
U-238	4.879E-06	0.0038	3.977E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.314E-07	0.0002
Total	1.262E-03	0.9887	1.078E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.335E-05	0.0105

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.383E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.060E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.149E-06	0.0072
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.067E-03	0.8357
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.389E-05	0.0579
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.152E-04	0.0902
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.039E-06	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.097E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.922E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.753E-06	0.0037
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.150E-06	0.0040
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.277E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	3.221E-07	0.0003	9.908E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.987E-06	0.0039
Ra-226	1.057E-03	0.8279	2.122E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.780E-06	0.0045
Ra-228	1.872E-06	0.0015	2.423E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-08	0.0000
Th-228	1.520E-06	0.0012	2.806E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.113E-09	0.0000
Th-230	7.782E-06	0.0061	3.326E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.420E-07	0.0005
Th-232	1.842E-04	0.1443	2.998E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.368E-06	0.0011
U-234	1.944E-08	0.0000	8.132E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.920E-07	0.0002
U-235	4.711E-06	0.0037	8.486E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.541E-08	0.0000
U-238	4.879E-06	0.0038	3.977E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.314E-07	0.0002
Total	1.262E-03	0.9887	1.078E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.335E-05	0.0105

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.409E-06	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.063E-03	0.8326
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.886E-06	0.0015
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.527E-06	0.0012
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.757E-06	0.0069
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.859E-04	0.1456
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.928E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.755E-06	0.0037
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.150E-06	0.0040
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.277E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	8.658E-07	0.000E+00	0.000E+00	0.000E+00	2.243E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.243E-04
Pa-231	6.018E-06	0.000E+00	0.000E+00	0.000E+00	1.560E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.560E-03
Pb-210	4.137E-01	0.000E+00	0.000E+00	0.000E+00	1.072E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.072E+02
Ra-226	4.170E-01	0.000E+00	0.000E+00	0.000E+00	1.081E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.081E+02
Ra-228	4.662E-02	0.000E+00	0.000E+00	0.000E+00	1.208E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.208E+01
Th-228	3.852E-02	0.000E+00	0.000E+00	0.000E+00	9.981E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E+00
Th-230	3.877E-01	0.000E+00	0.000E+00	0.000E+00	1.005E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.005E+02
Th-232	6.554E-02	0.000E+00	0.000E+00	0.000E+00	1.698E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.698E+01
U-234	2.407E-01	0.000E+00	0.000E+00	0.000E+00	6.238E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.238E+01
U-235	2.825E-02	0.000E+00	0.000E+00	0.000E+00	7.321E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.321E+00
U-238	1.436E-01	0.000E+00	0.000E+00	0.000E+00	3.720E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.720E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.222E-09	0.0000	3.096E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.453E-11	0.0000
Pa-231	6.360E-10	0.0000	2.021E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.304E-11	0.0000
Pb-210	5.427E-07	0.0004	1.669E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.403E-06	0.0064
Ra-226	1.064E-03	0.8150	1.449E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.363E-06	0.0018
Ra-228	8.207E-05	0.0629	9.473E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.075E-06	0.0008
Th-228	1.348E-04	0.1032	2.486E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.645E-07	0.0003
Th-230	9.959E-08	0.0001	3.310E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.079E-07	0.0005
Th-232	7.029E-09	0.0000	8.502E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.175E-07	0.0001
U-234	1.874E-08	0.0000	8.039E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.887E-07	0.0002
U-235	4.658E-06	0.0036	8.360E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.496E-08	0.0000
U-238	4.826E-06	0.0037	3.933E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.289E-07	0.0002
Total	1.291E-03	0.9888	1.114E-06	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.348E-05	0.0103

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.297E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.992E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.112E-06	0.0070
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.067E-03	0.8169
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.316E-05	0.0637
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-04	0.1037
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.038E-06	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.096E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.879E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.702E-06	0.0036
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.095E-06	0.0039
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.306E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	2.573E-07	0.0002	7.915E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.984E-06	0.0031
Ra-226	1.054E-03	0.8070	2.307E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.731E-06	0.0052
Ra-228	8.938E-07	0.0007	1.205E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.082E-09	0.0000
Th-228	1.203E-07	0.0001	2.220E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.254E-10	0.0000
Th-230	1.075E-05	0.0082	3.329E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.592E-07	0.0005
Th-232	2.159E-04	0.1653	3.417E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.551E-06	0.0012
U-234	1.959E-08	0.0000	8.044E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.888E-07	0.0002
U-235	4.661E-06	0.0036	8.411E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.505E-08	0.0000
U-238	4.826E-06	0.0037	3.933E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.289E-07	0.0002
Total	1.291E-03	0.9888	1.114E-06	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.348E-05	0.0103

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.320E-06	0.0033
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.061E-03	0.8123
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.001E-07	0.0007
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.209E-07	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.175E-05	0.0090
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.178E-04	0.1668
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.888E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.705E-06	0.0036
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.095E-06	0.0039
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.306E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	6.346E-06	0.000E+00	0.000E+00	0.000E+00	1.644E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.644E-03
Pa-231	1.773E-05	0.000E+00	0.000E+00	0.000E+00	4.595E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.595E-03
Pb-210	4.089E-01	0.000E+00	0.000E+00	0.000E+00	1.059E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.059E+02
Ra-226	4.162E-01	0.000E+00	0.000E+00	0.000E+00	1.079E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.079E+02
Ra-228	6.374E-02	0.000E+00	0.000E+00	0.000E+00	1.652E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.652E+01
Th-228	6.290E-02	0.000E+00	0.000E+00	0.000E+00	1.630E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.630E+01
Th-230	3.869E-01	0.000E+00	0.000E+00	0.000E+00	1.003E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.003E+02
Th-232	6.542E-02	0.000E+00	0.000E+00	0.000E+00	1.695E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.695E+01
U-234	2.332E-01	0.000E+00	0.000E+00	0.000E+00	6.043E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.043E+01
U-235	2.737E-02	0.000E+00	0.000E+00	0.000E+00	7.092E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.092E+00
U-238	1.391E-01	0.000E+00	0.000E+00	0.000E+00	3.604E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.604E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	5.645E-09	0.0000	7.861E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.131E-10	0.0000
Pa-231	1.126E-09	0.0000	3.577E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.618E-11	0.0000
Pb-210	5.382E-07	0.0004	1.656E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.333E-06	0.0063
Ra-226	1.063E-03	0.8015	1.446E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.359E-06	0.0018
Ra-228	8.828E-05	0.0666	1.018E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.155E-06	0.0009
Th-228	1.505E-04	0.1135	2.774E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.067E-07	0.0003
Th-230	9.941E-08	0.0001	3.303E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.067E-07	0.0005
Th-232	7.016E-09	0.0000	8.486E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.173E-07	0.0001
U-234	1.816E-08	0.0000	7.788E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.797E-07	0.0002
U-235	4.515E-06	0.0034	8.099E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.387E-08	0.0000
U-238	4.680E-06	0.0035	3.810E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.217E-07	0.0002
Total	1.311E-03	0.9890	1.137E-06	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.351E-05	0.0102

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.837E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.238E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.037E-06	0.0068
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.065E-03	0.8034
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.944E-05	0.0674
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.511E-04	0.1140
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.036E-06	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.092E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.757E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.557E-06	0.0034
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.939E-06	0.0037
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.326E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Pb-210	1.354E-07	0.0001	4.166E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.097E-06	0.0016
Ra-226	1.044E-03	0.7874	2.645E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.482E-06	0.0064
Ra-228	8.193E-08	0.0001	1.113E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.603E-10	0.0000
Th-228	8.563E-11	0.0000	1.579E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.315E-13	0.0000
Th-230	1.918E-05	0.0145	3.343E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.198E-07	0.0005
Th-232	2.387E-04	0.1800	3.723E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.679E-06	0.0013
U-234	2.065E-08	0.0000	7.796E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.799E-07	0.0002
U-235	4.522E-06	0.0034	8.213E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.406E-08	0.0000
U-238	4.680E-06	0.0035	3.810E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.218E-07	0.0002
Total	1.311E-03	0.9890	1.137E-06	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.351E-05	0.0102

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.274E-06	0.0017
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.053E-03	0.7940
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.250E-08	0.0001
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.602E-11	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.024E-05	0.0153
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.407E-04	0.1815
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.785E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.564E-06	0.0034
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.939E-06	0.0037
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.326E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	3.931E-05	0.000E+00	0.000E+00	0.000E+00	1.019E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.019E-02
Pa-231	5.551E-05	0.000E+00	0.000E+00	0.000E+00	1.438E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.438E-02
Pb-210	4.022E-01	0.000E+00	0.000E+00	0.000E+00	1.042E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.042E+02
Ra-226	4.136E-01	0.000E+00	0.000E+00	0.000E+00	1.072E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.072E+02
Ra-228	6.500E-02	0.000E+00	0.000E+00	0.000E+00	1.684E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.684E+01
Th-228	6.500E-02	0.000E+00	0.000E+00	0.000E+00	1.684E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.684E+01
Th-230	3.842E-01	0.000E+00	0.000E+00	0.000E+00	9.957E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.957E+01
Th-232	6.498E-02	0.000E+00	0.000E+00	0.000E+00	1.684E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.684E+01
U-234	2.087E-01	0.000E+00	0.000E+00	0.000E+00	5.407E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.407E+01
U-235	2.449E-02	0.000E+00	0.000E+00	0.000E+00	6.347E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.347E+00
U-238	1.245E-01	0.000E+00	0.000E+00	0.000E+00	3.225E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.225E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.116E-08	0.0000	2.938E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.226E-10	0.0000
Pa-231	2.712E-09	0.0000	8.593E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-10	0.0000
Pb-210	5.314E-07	0.0004	1.634E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.227E-06	0.0062
Ra-226	1.058E-03	0.8009	1.437E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.344E-06	0.0018
Ra-228	8.854E-05	0.0670	1.018E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.156E-06	0.0009
Th-228	1.512E-04	0.1144	2.785E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.082E-07	0.0003
Th-230	9.878E-08	0.0001	3.280E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.025E-07	0.0005
Th-232	6.971E-09	0.0000	8.429E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.165E-07	0.0001
U-234	1.625E-08	0.0000	6.969E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.503E-07	0.0002
U-235	4.048E-06	0.0031	7.247E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.031E-08	0.0000
U-238	4.199E-06	0.0032	3.409E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.984E-07	0.0002
Total	1.307E-03	0.9891	1.120E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.333E-05	0.0101

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.188E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.981E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.922E-06	0.0068
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.061E-03	0.8028
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.971E-05	0.0679
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-04	0.1149
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.029E-06	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.078E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.362E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.085E-06	0.0031
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.431E-06	0.0034
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.321E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.433E-08	0.0000	4.406E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.218E-07	0.0002
Ra-226	1.011E-03	0.7650	2.908E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.968E-06	0.0075
Ra-228	1.768E-11	0.0000	2.399E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.920E-14	0.0000
Th-228	8.233E-22	0.0000	1.517E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.223E-24	0.0000
Th-230	4.797E-05	0.0363	3.398E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.827E-07	0.0007
Th-232	2.397E-04	0.1814	3.729E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.680E-06	0.0013
U-234	3.125E-08	0.0000	6.988E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.507E-07	0.0002
U-235	4.071E-06	0.0031	7.627E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.091E-08	0.0000
U-238	4.199E-06	0.0032	3.411E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.985E-07	0.0002
Total	1.307E-03	0.9891	1.120E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.333E-05	0.0101

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.405E-07	0.0002
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.021E-03	0.7728
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.781E-11	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.270E-22	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.929E-05	0.0373
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.418E-04	0.1830
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.518E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.110E-06	0.0031
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.431E-06	0.0034
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.321E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.274E-04	0.000E+00	0.000E+00	0.000E+00	3.301E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.301E-02
Pa-231	1.398E-04	0.000E+00	0.000E+00	0.000E+00	3.622E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.622E-02
Pb-210	3.944E-01	0.000E+00	0.000E+00	0.000E+00	1.022E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.022E+02
Ra-226	4.060E-01	0.000E+00	0.000E+00	0.000E+00	1.052E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.052E+02
Ra-228	6.377E-02	0.000E+00	0.000E+00	0.000E+00	1.652E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.652E+01
Th-228	6.377E-02	0.000E+00	0.000E+00	0.000E+00	1.652E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.652E+01
Th-230	3.766E-01	0.000E+00	0.000E+00	0.000E+00	9.759E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.759E+01
Th-232	6.375E-02	0.000E+00	0.000E+00	0.000E+00	1.652E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.652E+01
U-234	1.519E-01	0.000E+00	0.000E+00	0.000E+00	3.936E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.936E+01
U-235	1.783E-02	0.000E+00	0.000E+00	0.000E+00	4.621E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.621E+00
U-238	9.062E-02	0.000E+00	0.000E+00	0.000E+00	2.348E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.348E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	6.036E-08	0.0000	8.323E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.197E-09	0.0000
Pa-231	6.270E-09	0.0000	1.977E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.211E-10	0.0000
Pb-210	5.215E-07	0.0004	1.603E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.070E-06	0.0062
Ra-226	1.039E-03	0.8026	1.411E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.301E-06	0.0018
Ra-228	8.715E-05	0.0673	9.991E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.134E-06	0.0009
Th-228	1.476E-04	0.1140	2.732E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.005E-07	0.0003
Th-230	9.698E-08	0.0001	3.215E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.905E-07	0.0005
Th-232	6.842E-09	0.0000	8.269E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.143E-07	0.0001
U-234	1.183E-08	0.0000	5.073E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.822E-07	0.0001
U-235	2.961E-06	0.0023	5.277E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.207E-08	0.0000
U-238	3.070E-06	0.0024	2.482E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.445E-07	0.0001
Total	1.280E-03	0.9892	1.071E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.296E-05	0.0100

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.239E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.889E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.752E-06	0.0068
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.041E-03	0.8045
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.829E-05	0.0682
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.483E-04	0.1145
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.009E-06	0.0008
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.039E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.448E-07	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.988E-06	0.0023
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.240E-06	0.0025
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.294E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	2.337E-11	0.0000	7.186E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.617E-10	0.0000
Ra-226	9.158E-04	0.7075	2.673E-07	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.227E-06	0.0071
Ra-228	5.901E-22	0.0000	8.022E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.317E-24	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.237E-04	0.0956	3.551E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.733E-06	0.0013
Th-232	2.347E-04	0.1813	3.659E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.648E-06	0.0013
U-234	1.089E-07	0.0001	5.119E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.838E-07	0.0001
U-235	3.028E-06	0.0023	6.307E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.369E-08	0.0000
U-238	3.070E-06	0.0024	2.485E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.446E-07	0.0001
Total	1.280E-03	0.9892	1.071E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.296E-05	0.0100

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.923E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.253E-04	0.7148
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.942E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.258E-04	0.0972
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.367E-04	0.1829
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.438E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.058E-06	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.240E-06	0.0025
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.294E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-226	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents
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Part III: Intake Quantities and Health Risk Factors
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Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.898E-02	4.178E+01	3.363E-02	4.673E-02	1.332E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.517E+01
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	1.646E+00	1.449E+04	2.054E+02	1.001E+02	1.155E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.595E+04
Ra-226	1.557E+00	5.481E+04	6.628E+02	8.115E+02	1.092E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.738E+04
Ra-228	7.118E-03	2.506E+02	3.030E+00	3.710E+00	4.993E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.623E+02
Th-228	3.381E-02	2.979E+01	2.540E-01	1.812E-02	2.372E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.377E+01
Th-230	9.164E-01	8.073E+02	6.884E+00	4.911E-01	6.429E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.458E+03
Th-232	3.322E-02	2.926E+01	2.495E-01	1.780E-02	2.330E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.283E+01
U-234	1.976E+00	4.349E+03	5.952E+01	1.459E+02	1.386E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.940E+03
U-235	4.389E-02	9.661E+01	1.322E+00	3.242E+00	3.079E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.320E+02
U-238	6.115E-01	1.346E+03	1.842E+01	4.517E+01	4.290E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.839E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.619E-06	0.0008	7.661E-08	0.0000	5.269E-07	0.0001	4.246E-10	0.0000	5.894E-10	0.0000	2.983E-07	0.0000
Pa-231	4.985E-10	0.0000	1.891E-11	0.0000	8.253E-10	0.0000	7.276E-11	0.0000	9.614E-14	0.0000	1.090E-10	0.0000
Pb-210	1.807E-06	0.0003	6.547E-07	0.0001	1.465E-03	0.2427	2.093E-05	0.0035	1.016E-05	0.0017	8.922E-05	0.0148
Ra-226	3.367E-03	0.5576	5.402E-07	0.0001	8.443E-04	0.1398	1.021E-05	0.0017	1.250E-05	0.0021	2.385E-05	0.0039
Ra-228	3.027E-05	0.0050	4.108E-09	0.0000	4.016E-05	0.0066	4.768E-07	0.0001	5.887E-07	0.0001	1.262E-06	0.0002
Th-228	5.233E-05	0.0087	1.130E-07	0.0000	4.380E-07	0.0001	5.653E-09	0.0000	3.762E-10	0.0000	4.484E-07	0.0001
Th-230	1.963E-07	0.0000	7.833E-07	0.0001	2.881E-06	0.0005	2.457E-08	0.0000	1.753E-09	0.0000	3.895E-06	0.0006
Th-232	2.981E-09	0.0000	4.313E-08	0.0000	1.167E-07	0.0000	9.951E-10	0.0000	7.099E-11	0.0000	1.614E-07	0.0000
U-234	1.305E-07	0.0000	6.710E-07	0.0001	1.237E-05	0.0020	1.693E-07	0.0000	4.152E-07	0.0001	6.524E-06	0.0011
U-235	6.146E-06	0.0010	1.321E-08	0.0000	2.809E-07	0.0000	3.845E-09	0.0000	9.426E-09	0.0000	1.495E-07	0.0000
U-238	1.771E-05	0.0029	1.703E-07	0.0000	4.852E-06	0.0008	6.641E-08	0.0000	1.628E-07	0.0000	2.684E-06	0.0004
Total	3.481E-03	0.5763	3.070E-06	0.0005	2.371E-03	0.3927	3.189E-05	0.0053	2.384E-05	0.0039	1.285E-04	0.0213

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.522E-06	0.0009
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.525E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.588E-03	0.2630
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.259E-03	0.7052
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.276E-05	0.0120
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.334E-05	0.0088
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.782E-06	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.253E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.028E-05	0.0034
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.603E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.565E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.039E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.618E-06	0.0008	7.659E-08	0.0000	0.000E+00	0.0000	5.267E-07	0.0001	4.241E-10	0.0000	5.892E-10	0.0000	2.982E-07	0.0000
Pb-210	1.198E-06	0.0002	4.341E-07	0.0001	0.000E+00	0.0000	9.686E-04	0.1604	1.374E-05	0.0023	6.693E-06	0.0011	5.916E-05	0.0098
Ra-226	3.355E-03	0.5555	7.582E-07	0.0001	0.000E+00	0.0000	1.337E-03	0.2213	1.734E-05	0.0029	1.591E-05	0.0026	5.374E-05	0.0089
Ra-228	5.967E-06	0.0010	8.402E-09	0.0000	0.000E+00	0.0000	2.984E-06	0.0005	3.611E-08	0.0000	4.375E-08	0.0000	1.244E-07	0.0000
Th-228	6.181E-06	0.0010	1.334E-08	0.0000	0.000E+00	0.0000	3.469E-08	0.0000	2.958E-10	0.0000	2.110E-11	0.0000	5.296E-08	0.0000
Th-230	1.305E-05	0.0022	7.857E-07	0.0001	0.000E+00	0.0000	7.459E-06	0.0012	8.301E-08	0.0000	5.869E-08	0.0000	4.067E-06	0.0007
Th-232	7.046E-05	0.0117	1.385E-07	0.0000	0.000E+00	0.0000	3.770E-05	0.0062	4.470E-07	0.0001	5.454E-07	0.0001	1.694E-06	0.0003
U-234	1.330E-07	0.0000	6.712E-07	0.0001	0.000E+00	0.0000	1.237E-05	0.0020	1.693E-07	0.0000	4.152E-07	0.0001	6.525E-06	0.0011
U-235	6.148E-06	0.0010	1.325E-08	0.0000	0.000E+00	0.0000	2.819E-07	0.0000	3.918E-09	0.0000	9.427E-09	0.0000	1.497E-07	0.0000
U-238	1.771E-05	0.0029	1.703E-07	0.0000	0.000E+00	0.0000	4.852E-06	0.0008	6.641E-08	0.0000	1.628E-07	0.0000	2.684E-06	0.0004
Total	3.481E-03	0.5763	3.070E-06	0.0005	0.000E+00	0.0000	2.371E-03	0.3927	3.189E-05	0.0053	2.384E-05	0.0039	1.285E-04	0.0213

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.520E-06	0.0009
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.050E-03	0.1738
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.779E-03	0.7914
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.163E-06	0.0015
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.283E-06	0.0010
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.551E-05	0.0042
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.110E-04	0.0184
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.029E-05	0.0034
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.606E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.565E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.039E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.838E-02	4.047E+01	3.258E-02	4.526E-02	1.290E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.344E+01
Pa-231	9.284E-07	7.954E-03	6.476E-04	1.081E-06	6.513E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.254E-03
Pb-210	1.643E+00	1.450E+04	2.071E+02	1.005E+02	1.152E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.596E+04
Ra-226	1.557E+00	5.480E+04	6.626E+02	8.114E+02	1.092E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.737E+04
Ra-228	1.008E-02	3.500E+02	4.029E+00	5.046E+00	7.072E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.662E+02
Th-228	2.618E-02	2.743E+01	2.889E-01	1.990E-02	1.837E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.610E+01
Th-230	9.164E-01	8.073E+02	6.884E+00	4.911E-01	6.429E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.458E+03
Th-232	3.321E-02	2.926E+01	2.495E-01	1.780E-02	2.330E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.283E+01
U-234	1.975E+00	4.347E+03	5.949E+01	1.459E+02	1.385E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.938E+03
U-235	4.387E-02	9.657E+01	1.322E+00	3.240E+00	3.078E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.319E+02
U-238	6.112E-01	1.345E+03	1.841E+01	4.515E+01	4.288E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.838E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.474E-06	0.0007	7.421E-08	0.0000	5.104E-07	0.0001	4.113E-10	0.0000	5.709E-10	0.0000	2.890E-07	0.0000
Pa-231	5.316E-10	0.0000	2.017E-11	0.0000	8.802E-10	0.0000	7.763E-11	0.0000	1.025E-13	0.0000	1.163E-10	0.0000
Pb-210	1.804E-06	0.0003	6.538E-07	0.0001	1.464E-03	0.2424	2.090E-05	0.0035	1.015E-05	0.0017	8.910E-05	0.0148
Ra-226	3.367E-03	0.5575	5.401E-07	0.0001	8.442E-04	0.1398	1.021E-05	0.0017	1.250E-05	0.0021	2.385E-05	0.0039
Ra-228	3.119E-05	0.0052	4.233E-09	0.0000	4.139E-05	0.0069	4.915E-07	0.0001	6.068E-07	0.0001	1.300E-06	0.0002
Th-228	5.250E-05	0.0087	1.133E-07	0.0000	4.437E-07	0.0001	5.768E-09	0.0000	3.835E-10	0.0000	4.498E-07	0.0001
Th-230	1.963E-07	0.0000	7.833E-07	0.0001	2.881E-06	0.0005	2.457E-08	0.0000	1.753E-09	0.0000	3.895E-06	0.0006
Th-232	2.981E-09	0.0000	4.313E-08	0.0000	1.167E-07	0.0000	9.951E-10	0.0000	7.099E-11	0.0000	1.614E-07	0.0000
U-234	1.304E-07	0.0000	6.706E-07	0.0001	1.237E-05	0.0020	1.693E-07	0.0000	4.150E-07	0.0001	6.521E-06	0.0011
U-235	6.143E-06	0.0010	1.320E-08	0.0000	2.808E-07	0.0000	3.843E-09	0.0000	9.422E-09	0.0000	1.495E-07	0.0000
U-238	1.770E-05	0.0029	1.703E-07	0.0000	4.850E-06	0.0008	6.638E-08	0.0000	1.627E-07	0.0000	2.683E-06	0.0004
Total	3.481E-03	0.5764	3.066E-06	0.0005	2.371E-03	0.3926	3.187E-05	0.0053	2.384E-05	0.0039	1.284E-04	0.0213

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.349E-06	0.0009
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.626E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.586E-03	0.2627
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.258E-03	0.7051
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.498E-05	0.0124
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.351E-05	0.0089
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.782E-06	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.253E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.027E-05	0.0034
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.600E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.564E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.039E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.473E-06	0.0007	7.419E-08	0.0000	0.000E+00	0.0000	5.102E-07	0.0001	4.107E-10	0.0000	5.707E-10	0.0000	2.889E-07	0.0000
Pb-210	1.161E-06	0.0002	4.207E-07	0.0001	0.000E+00	0.0000	9.387E-04	0.1555	1.331E-05	0.0022	6.487E-06	0.0011	5.733E-05	0.0095
Ra-226	3.354E-03	0.5554	7.704E-07	0.0001	0.000E+00	0.0000	1.364E-03	0.2259	1.773E-05	0.0029	1.610E-05	0.0027	5.543E-05	0.0092
Ra-228	5.660E-06	0.0009	8.249E-09	0.0000	0.000E+00	0.0000	2.648E-06	0.0004	3.204E-08	0.0000	3.878E-08	0.0000	1.135E-07	0.0000
Th-228	4.302E-06	0.0007	9.287E-09	0.0000	0.000E+00	0.0000	2.415E-08	0.0000	2.059E-10	0.0000	1.469E-11	0.0000	3.686E-08	0.0000
Th-230	1.391E-05	0.0023	7.859E-07	0.0001	0.000E+00	0.0000	7.803E-06	0.0013	8.747E-08	0.0000	6.277E-08	0.0000	4.081E-06	0.0007
Th-232	7.373E-05	0.0122	1.432E-07	0.0000	0.000E+00	0.0000	3.927E-05	0.0065	4.661E-07	0.0001	5.685E-07	0.0001	1.761E-06	0.0003
U-234	1.332E-07	0.0000	6.709E-07	0.0001	0.000E+00	0.0000	1.237E-05	0.0020	1.693E-07	0.0000	4.150E-07	0.0001	6.522E-06	0.0011
U-235	6.145E-06	0.0010	1.324E-08	0.0000	0.000E+00	0.0000	2.818E-07	0.0000	3.921E-09	0.0000	9.422E-09	0.0000	1.497E-07	0.0000
U-238	1.770E-05	0.0029	1.703E-07	0.0000	0.000E+00	0.0000	4.850E-06	0.0008	6.638E-08	0.0000	1.627E-07	0.0000	2.683E-06	0.0004
Total	3.481E-03	0.5764	3.066E-06	0.0005	0.000E+00	0.0000	2.371E-03	0.3926	3.187E-05	0.0053	2.384E-05	0.0039	1.284E-04	0.0213

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.347E-06	0.0009
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.017E-03	0.1685
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.808E-03	0.7962
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.500E-06	0.0014
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.373E-06	0.0007
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.673E-05	0.0044
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.159E-04	0.0192
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.028E-05	0.0034
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.603E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.564E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.039E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.725E-02	3.796E+01	3.057E-02	4.247E-02	1.210E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.014E+01
Pa-231	2.784E-06	2.428E-02	2.095E-03	2.961E-06	1.953E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.834E-02
Pb-210	1.637E+00	1.445E+04	2.064E+02	1.002E+02	1.148E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.590E+04
Ra-226	1.556E+00	5.478E+04	6.624E+02	8.110E+02	1.092E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.734E+04
Ra-228	1.504E-02	5.245E+02	6.139E+00	7.629E+00	1.055E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.488E+02
Th-228	1.936E-02	2.359E+01	2.860E-01	1.926E-02	1.358E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.748E+01
Th-230	9.163E-01	8.073E+02	6.884E+00	4.911E-01	6.428E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.458E+03
Th-232	3.321E-02	2.926E+01	2.495E-01	1.780E-02	2.330E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.283E+01
U-234	1.973E+00	4.343E+03	5.944E+01	1.457E+02	1.384E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.932E+03
U-235	4.383E-02	9.648E+01	1.320E+00	3.237E+00	3.075E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.318E+02
U-238	6.107E-01	1.344E+03	1.840E+01	4.511E+01	4.284E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.836E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0
Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.198E-06	0.0007	6.963E-08	0.0000	4.789E-07	0.0001	3.860E-10	0.0000	5.356E-10	0.0000	2.711E-07	0.0000
Pa-231	5.978E-10	0.0000	2.268E-11	0.0000	9.900E-10	0.0000	8.736E-11	0.0000	1.151E-13	0.0000	1.308E-10	0.0000
Pb-210	1.800E-06	0.0003	6.521E-07	0.0001	1.460E-03	0.2418	2.085E-05	0.0035	1.012E-05	0.0017	8.887E-05	0.0147
Ra-226	3.365E-03	0.5574	5.399E-07	0.0001	8.439E-04	0.1398	1.020E-05	0.0017	1.249E-05	0.0021	2.384E-05	0.0039
Ra-228	3.273E-05	0.0054	4.442E-09	0.0000	4.344E-05	0.0072	5.164E-07	0.0001	6.372E-07	0.0001	1.364E-06	0.0002
Th-228	5.386E-05	0.0089	1.163E-07	0.0000	4.588E-07	0.0001	5.998E-09	0.0000	3.984E-10	0.0000	4.615E-07	0.0001
Th-230	1.963E-07	0.0000	7.833E-07	0.0001	2.881E-06	0.0005	2.457E-08	0.0000	1.753E-09	0.0000	3.895E-06	0.0006
Th-232	2.981E-09	0.0000	4.312E-08	0.0000	1.167E-07	0.0000	9.950E-10	0.0000	7.099E-11	0.0000	1.614E-07	0.0000
U-234	1.303E-07	0.0000	6.700E-07	0.0001	1.235E-05	0.0020	1.691E-07	0.0000	4.146E-07	0.0001	6.515E-06	0.0011
U-235	6.137E-06	0.0010	1.319E-08	0.0000	2.805E-07	0.0000	3.839E-09	0.0000	9.413E-09	0.0000	1.493E-07	0.0000
U-238	1.769E-05	0.0029	1.701E-07	0.0000	4.845E-06	0.0008	6.632E-08	0.0000	1.626E-07	0.0000	2.680E-06	0.0004
Total	3.482E-03	0.5767	3.062E-06	0.0005	2.368E-03	0.3923	3.184E-05	0.0053	2.384E-05	0.0039	1.282E-04	0.0212

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.019E-06	0.0008
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.829E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.582E-03	0.2620
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.256E-03	0.7050
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.869E-05	0.0130
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.491E-05	0.0091
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.782E-06	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.253E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.025E-05	0.0034
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.594E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.561E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.038E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.196E-06	0.0007	6.960E-08	0.0000	0.000E+00	0.0000	4.787E-07	0.0001	3.854E-10	0.0000	5.354E-10	0.0000	2.710E-07	0.0000
Pb-210	1.090E-06	0.0002	3.951E-07	0.0001	0.000E+00	0.0000	8.816E-04	0.1460	1.250E-05	0.0021	6.092E-06	0.0010	5.384E-05	0.0089
Ra-226	3.351E-03	0.5550	7.937E-07	0.0001	0.000E+00	0.0000	1.416E-03	0.2346	1.848E-05	0.0031	1.645E-05	0.0027	5.864E-05	0.0097
Ra-228	4.856E-06	0.0008	7.364E-09	0.0000	0.000E+00	0.0000	2.083E-06	0.0003	2.519E-08	0.0000	3.047E-08	0.0000	9.268E-08	0.0000
Th-228	2.084E-06	0.0003	4.500E-09	0.0000	0.000E+00	0.0000	1.170E-08	0.0000	9.975E-11	0.0000	7.116E-12	0.0000	1.786E-08	0.0000
Th-230	1.562E-05	0.0026	7.862E-07	0.0001	0.000E+00	0.0000	8.511E-06	0.0014	9.670E-08	0.0000	7.106E-08	0.0000	4.109E-06	0.0007
Th-232	7.965E-05	0.0132	1.520E-07	0.0000	0.000E+00	0.0000	4.192E-05	0.0069	4.981E-07	0.0001	6.072E-07	0.0001	1.877E-06	0.0003
U-234	1.337E-07	0.0000	6.703E-07	0.0001	0.000E+00	0.0000	1.236E-05	0.0020	1.691E-07	0.0000	4.146E-07	0.0001	6.516E-06	0.0011
U-235	6.140E-06	0.0010	1.324E-08	0.0000	0.000E+00	0.0000	2.817E-07	0.0000	3.927E-09	0.0000	9.414E-09	0.0000	1.496E-07	0.0000
U-238	1.769E-05	0.0029	1.701E-07	0.0000	0.000E+00	0.0000	4.845E-06	0.0008	6.632E-08	0.0000	1.626E-07	0.0000	2.680E-06	0.0004
Total	3.482E-03	0.5767	3.062E-06	0.0005	0.000E+00	0.0000	2.368E-03	0.3923	3.184E-05	0.0053	2.384E-05	0.0039	1.282E-04	0.0212

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.017E-06	0.0008
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.555E-04	0.1583
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.861E-03	0.8052
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.095E-06	0.0012
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.119E-06	0.0004
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.919E-05	0.0048
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.247E-04	0.0207
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.026E-05	0.0034
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.598E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.561E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.038E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.380E-02	3.037E+01	2.446E-02	3.397E-02	9.679E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.011E+01
Pa-231	9.261E-06	8.130E-02	7.148E-03	9.527E-06	6.497E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.495E-02
Pb-210	1.618E+00	1.428E+04	2.040E+02	9.901E+01	1.135E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.572E+04
Ra-226	1.554E+00	5.470E+04	6.614E+02	8.099E+02	1.090E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.727E+04
Ra-228	2.539E-02	8.890E+02	1.055E+01	1.303E+01	1.781E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.304E+02
Th-228	2.255E-02	3.095E+01	4.111E-01	2.726E-02	1.582E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.721E+01
Th-230	9.162E-01	8.072E+02	6.883E+00	4.910E-01	6.428E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.457E+03
Th-232	3.321E-02	2.925E+01	2.494E-01	1.779E-02	2.330E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.282E+01
U-234	1.966E+00	4.329E+03	5.924E+01	1.453E+02	1.380E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.913E+03
U-235	4.369E-02	9.616E+01	1.316E+00	3.227E+00	3.065E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.314E+02
U-238	6.087E-01	1.340E+03	1.834E+01	4.496E+01	4.270E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.830E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.359E-06	0.0006	5.572E-08	0.0000	3.832E-07	0.0001	3.091E-10	0.0000	4.286E-10	0.0000	2.170E-07	0.0000
Pa-231	8.290E-10	0.0000	3.145E-11	0.0000	1.373E-09	0.0000	1.213E-10	0.0000	1.593E-13	0.0000	1.813E-10	0.0000
Pb-210	1.785E-06	0.0003	6.468E-07	0.0001	1.448E-03	0.2400	2.068E-05	0.0034	1.004E-05	0.0017	8.814E-05	0.0146
Ra-226	3.361E-03	0.5572	5.392E-07	0.0001	8.427E-04	0.1397	1.019E-05	0.0017	1.248E-05	0.0021	2.380E-05	0.0039
Ra-228	3.594E-05	0.0060	4.878E-09	0.0000	4.773E-05	0.0079	5.682E-07	0.0001	7.007E-07	0.0001	1.498E-06	0.0002
Th-228	5.990E-05	0.0099	1.293E-07	0.0000	5.081E-07	0.0001	6.630E-09	0.0000	4.404E-10	0.0000	5.132E-07	0.0001
Th-230	1.963E-07	0.0000	7.832E-07	0.0001	2.881E-06	0.0005	2.456E-08	0.0000	1.752E-09	0.0000	3.894E-06	0.0006
Th-232	2.981E-09	0.0000	4.312E-08	0.0000	1.167E-07	0.0000	9.949E-10	0.0000	7.097E-11	0.0000	1.614E-07	0.0000
U-234	1.299E-07	0.0000	6.678E-07	0.0001	1.231E-05	0.0020	1.685E-07	0.0000	4.132E-07	0.0001	6.493E-06	0.0011
U-235	6.117E-06	0.0010	1.314E-08	0.0000	2.796E-07	0.0000	3.827E-09	0.0000	9.382E-09	0.0000	1.488E-07	0.0000
U-238	1.763E-05	0.0029	1.695E-07	0.0000	4.829E-06	0.0008	6.610E-08	0.0000	1.621E-07	0.0000	2.671E-06	0.0004
Total	3.486E-03	0.5779	3.053E-06	0.0005	2.360E-03	0.3912	3.171E-05	0.0053	2.380E-05	0.0039	1.275E-04	0.0211

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.016E-06	0.0007
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.537E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.569E-03	0.2602
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.250E-03	0.7047
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.645E-05	0.0143
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.106E-05	0.0101
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.781E-06	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.252E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.019E-05	0.0033
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.572E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.553E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.032E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.356E-06	0.0006	5.567E-08	0.0000	0.000E+00	0.0000	3.829E-07	0.0001	3.082E-10	0.0000	4.283E-10	0.0000	2.168E-07	0.0000
Pb-210	8.754E-07	0.0001	3.172E-07	0.0001	0.000E+00	0.0000	7.078E-04	0.1173	1.004E-05	0.0017	4.891E-06	0.0008	4.323E-05	0.0072
Ra-226	3.340E-03	0.5538	8.641E-07	0.0001	0.000E+00	0.0000	1.575E-03	0.2610	2.073E-05	0.0034	1.752E-05	0.0029	6.839E-05	0.0113
Ra-228	2.319E-06	0.0004	3.665E-09	0.0000	0.000E+00	0.0000	8.968E-07	0.0001	1.084E-08	0.0000	1.310E-08	0.0000	4.183E-08	0.0000
Th-228	1.650E-07	0.0000	3.561E-10	0.0000	0.000E+00	0.0000	9.259E-10	0.0000	7.895E-12	0.0000	5.632E-13	0.0000	1.413E-09	0.0000
Th-230	2.158E-05	0.0036	7.875E-07	0.0001	0.000E+00	0.0000	1.118E-05	0.0019	1.317E-07	0.0000	1.014E-07	0.0000	4.222E-06	0.0007
Th-232	9.336E-05	0.0155	1.733E-07	0.0000	0.000E+00	0.0000	4.746E-05	0.0079	5.650E-07	0.0001	6.881E-07	0.0001	2.130E-06	0.0004
U-234	1.358E-07	0.0000	6.682E-07	0.0001	0.000E+00	0.0000	1.232E-05	0.0020	1.686E-07	0.0000	4.132E-07	0.0001	6.495E-06	0.0011
U-235	6.121E-06	0.0010	1.322E-08	0.0000	0.000E+00	0.0000	2.813E-07	0.0000	3.949E-09	0.0000	9.383E-09	0.0000	1.492E-07	0.0000
U-238	1.763E-05	0.0029	1.696E-07	0.0000	0.000E+00	0.0000	4.830E-06	0.0008	6.610E-08	0.0000	1.621E-07	0.0000	2.672E-06	0.0004
Total	3.486E-03	0.5779	3.053E-06	0.0005	0.000E+00	0.0000	2.360E-03	0.3912	3.171E-05	0.0053	2.380E-05	0.0039	1.275E-04	0.0211

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.013E-06	0.0007
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.671E-04	0.1272
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.022E-03	0.8327
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.285E-06	0.0005
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.677E-07	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.801E-05	0.0063
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.444E-04	0.0239
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.020E-05	0.0033
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.578E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.553E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.032E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	7.298E-03	1.606E+01	1.297E-02	1.797E-02	5.120E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.122E+01
Pa-231	2.763E-05	2.430E-01	2.148E-02	2.815E-05	1.938E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.839E-01
Pb-210	1.579E+00	1.395E+04	1.992E+02	9.669E+01	1.108E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.535E+04
Ra-226	1.548E+00	5.449E+04	6.589E+02	8.068E+02	1.086E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.704E+04
Ra-228	3.249E-02	1.139E+03	1.357E+01	1.673E+01	2.279E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.192E+03
Th-228	3.214E-02	4.251E+01	5.524E-01	3.670E-02	2.255E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.565E+01
Th-230	9.159E-01	8.069E+02	6.880E+00	4.908E-01	6.425E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.457E+03
Th-232	3.319E-02	2.924E+01	2.493E-01	1.778E-02	2.328E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.279E+01
U-234	1.948E+00	4.288E+03	5.869E+01	1.439E+02	1.367E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.857E+03
U-235	4.328E-02	9.527E+01	1.304E+00	3.197E+00	3.036E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.301E+02
U-238	6.030E-01	1.327E+03	1.817E+01	4.454E+01	4.230E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.813E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.781E-06	0.0003	2.953E-08	0.0000	2.031E-07	0.0000	1.646E-10	0.0000	2.272E-10	0.0000	1.150E-07	0.0000
Pa-231	1.485E-09	0.0000	5.632E-11	0.0000	2.461E-09	0.0000	2.177E-10	0.0000	2.845E-13	0.0000	3.248E-10	0.0000
Pb-210	1.755E-06	0.0003	6.359E-07	0.0001	1.424E-03	0.2374	2.033E-05	0.0034	9.869E-06	0.0016	8.666E-05	0.0145
Ra-226	3.348E-03	0.5582	5.371E-07	0.0001	8.394E-04	0.1400	1.015E-05	0.0017	1.243E-05	0.0021	2.371E-05	0.0040
Ra-228	3.814E-05	0.0064	5.176E-09	0.0000	5.065E-05	0.0084	6.036E-07	0.0001	7.440E-07	0.0001	1.590E-06	0.0003
Th-228	6.537E-05	0.0109	1.411E-07	0.0000	5.494E-07	0.0001	7.127E-09	0.0000	4.736E-10	0.0000	5.600E-07	0.0001
Th-230	1.962E-07	0.0000	7.829E-07	0.0001	2.880E-06	0.0005	2.456E-08	0.0000	1.752E-09	0.0000	3.893E-06	0.0006
Th-232	2.979E-09	0.0000	4.309E-08	0.0000	1.166E-07	0.0000	9.943E-10	0.0000	7.093E-11	0.0000	1.613E-07	0.0000
U-234	1.287E-07	0.0000	6.616E-07	0.0001	1.220E-05	0.0020	1.670E-07	0.0000	4.094E-07	0.0001	6.433E-06	0.0011
U-235	6.061E-06	0.0010	1.302E-08	0.0000	2.770E-07	0.0000	3.791E-09	0.0000	9.295E-09	0.0000	1.474E-07	0.0000
U-238	1.747E-05	0.0029	1.680E-07	0.0000	4.785E-06	0.0008	6.548E-08	0.0000	1.606E-07	0.0000	2.647E-06	0.0004
Total	3.479E-03	0.5800	3.017E-06	0.0005	2.335E-03	0.3893	3.136E-05	0.0052	2.362E-05	0.0039	1.259E-04	0.0210

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.129E-06	0.0004
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.544E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.543E-03	0.2573
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.234E-03	0.7060
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.173E-05	0.0153
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.663E-05	0.0111
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.778E-06	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.250E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.000E-05	0.0033
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.511E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.529E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.997E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
	Radionuclides							
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.773E-06	0.0003	2.941E-08	0.0000	0.000E+00	0.0000	2.023E-07	0.0000	1.628E-10	0.0000	2.263E-10	0.0000	1.145E-07	0.0000
Pb-210	4.673E-07	0.0001	1.693E-07	0.0000	0.000E+00	0.0000	3.778E-04	0.0630	5.358E-06	0.0009	2.611E-06	0.0004	2.308E-05	0.0038
Ra-226	3.311E-03	0.5520	9.941E-07	0.0002	0.000E+00	0.0000	1.868E-03	0.3115	2.490E-05	0.0042	1.949E-05	0.0033	8.656E-05	0.0144
Ra-228	2.126E-07	0.0000	3.387E-10	0.0000	0.000E+00	0.0000	8.047E-08	0.0000	9.728E-10	0.0000	1.175E-09	0.0000	3.792E-09	0.0000
Th-228	1.175E-10	0.0000	2.537E-13	0.0000	0.000E+00	0.0000	6.596E-13	0.0000	5.624E-15	0.0000	4.012E-16	0.0000	1.007E-12	0.0000
Th-230	3.852E-05	0.0064	7.917E-07	0.0001	0.000E+00	0.0000	2.003E-05	0.0033	2.491E-07	0.0000	1.962E-07	0.0000	4.619E-06	0.0008
Th-232	1.033E-04	0.0172	1.890E-07	0.0000	0.000E+00	0.0000	5.124E-05	0.0085	6.107E-07	0.0001	7.434E-07	0.0001	2.307E-06	0.0004
U-234	1.461E-07	0.0000	6.622E-07	0.0001	0.000E+00	0.0000	1.221E-05	0.0020	1.671E-07	0.0000	4.094E-07	0.0001	6.436E-06	0.0011
U-235	6.069E-06	0.0010	1.320E-08	0.0000	0.000E+00	0.0000	2.803E-07	0.0000	4.011E-09	0.0000	9.297E-09	0.0000	1.482E-07	0.0000
U-238	1.747E-05	0.0029	1.680E-07	0.0000	0.000E+00	0.0000	4.785E-06	0.0008	6.549E-08	0.0000	1.606E-07	0.0000	2.647E-06	0.0004
Total	3.479E-03	0.5800	3.017E-06	0.0005	0.000E+00	0.0000	2.335E-03	0.3893	3.136E-05	0.0052	2.362E-05	0.0039	1.259E-04	0.0210

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.120E-06	0.0004
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.095E-04	0.0683
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.311E-03	0.8855
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.994E-07	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.195E-10	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.441E-05	0.0107
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.584E-04	0.0264
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.003E-05	0.0033
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.525E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.529E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.997E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	8.446E-04	1.860E+00	1.620E-03	2.080E-03	5.925E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.456E+00
Pa-231	9.036E-05	7.951E-01	7.042E-02	9.173E-05	6.339E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.290E-01
Pb-210	1.526E+00	1.348E+04	1.925E+02	9.343E+01	1.071E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.483E+04
Ra-226	1.527E+00	5.376E+04	6.500E+02	7.959E+02	1.071E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.628E+04
Ra-228	3.312E-02	1.161E+03	1.384E+01	1.706E+01	2.324E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.215E+03
Th-228	3.312E-02	4.366E+01	5.660E-01	3.762E-02	2.324E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.750E+01
Th-230	9.147E-01	8.059E+02	6.871E+00	4.902E-01	6.417E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.455E+03
Th-232	3.312E-02	2.918E+01	2.488E-01	1.775E-02	2.324E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.268E+01
U-234	1.885E+00	4.150E+03	5.680E+01	1.393E+02	1.323E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.668E+03
U-235	4.189E-02	9.221E+01	1.262E+00	3.094E+00	2.939E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.260E+02
U-238	5.836E-01	1.285E+03	1.758E+01	4.311E+01	4.094E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.755E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.189E-07	0.0000	3.631E-09	0.0000	2.498E-08	0.0000	2.286E-11	0.0000	2.794E-11	0.0000	1.414E-08	0.0000
Pa-231	3.723E-09	0.0000	1.412E-10	0.0000	6.173E-09	0.0000	5.468E-10	0.0000	7.120E-13	0.0000	8.145E-10	0.0000
Pb-210	1.708E-06	0.0003	6.189E-07	0.0001	1.385E-03	0.2350	1.979E-05	0.0034	9.605E-06	0.0016	8.434E-05	0.0143
Ra-226	3.303E-03	0.5602	5.299E-07	0.0001	8.282E-04	0.1405	1.001E-05	0.0017	1.226E-05	0.0021	2.339E-05	0.0040
Ra-228	3.828E-05	0.0065	5.195E-09	0.0000	5.084E-05	0.0086	6.059E-07	0.0001	7.468E-07	0.0001	1.596E-06	0.0003
Th-228	6.580E-05	0.0112	1.420E-07	0.0000	5.525E-07	0.0001	7.163E-09	0.0000	4.760E-10	0.0000	5.637E-07	0.0001
Th-230	1.960E-07	0.0000	7.819E-07	0.0001	2.876E-06	0.0005	2.452E-08	0.0000	1.750E-09	0.0000	3.888E-06	0.0007
Th-232	2.973E-09	0.0000	4.301E-08	0.0000	1.164E-07	0.0000	9.923E-10	0.0000	7.079E-11	0.0000	1.610E-07	0.0000
U-234	1.245E-07	0.0000	6.402E-07	0.0001	1.181E-05	0.0020	1.616E-07	0.0000	3.962E-07	0.0001	6.225E-06	0.0011
U-235	5.866E-06	0.0010	1.260E-08	0.0000	2.681E-07	0.0000	3.669E-09	0.0000	8.997E-09	0.0000	1.427E-07	0.0000
U-238	1.691E-05	0.0029	1.626E-07	0.0000	4.631E-06	0.0008	6.338E-08	0.0000	1.554E-07	0.0000	2.561E-06	0.0004
Total	3.432E-03	0.5820	2.940E-06	0.0005	2.285E-03	0.3875	3.067E-05	0.0052	2.318E-05	0.0039	1.229E-04	0.0208

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.617E-07	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.140E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.502E-03	0.2546
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.177E-03	0.7084
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.207E-05	0.0156
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.707E-05	0.0114
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.768E-06	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.244E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.935E-05	0.0033
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.302E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.448E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.896E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

(Columns Rn-222 through Bi-212 under heading: Radionuclides)

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.901E-07	0.0000	3.152E-09	0.0000	0.000E+00	0.0000	2.168E-08	0.0000	1.745E-11	0.0000	2.425E-11	0.0000	1.227E-08	0.0000
Pb-210	5.196E-08	0.0000	1.883E-08	0.0000	0.000E+00	0.0000	4.201E-05	0.0071	5.957E-07	0.0001	2.903E-07	0.0000	2.566E-06	0.0004
Ra-226	3.208E-03	0.5441	1.101E-06	0.0002	0.000E+00	0.0000	2.118E-03	0.3592	2.850E-05	0.0048	2.101E-05	0.0036	1.027E-04	0.0174
Ra-228	4.597E-11	0.0000	7.323E-14	0.0000	0.000E+00	0.0000	1.739E-11	0.0000	2.103E-13	0.0000	2.541E-13	0.0000	8.196E-13	0.0000
Th-228	1.134E-21	0.0000	2.448E-24	0.0000	0.000E+00	0.0000	6.365E-24	0.0000	5.426E-26	0.0000	3.865E-27	0.0000	9.716E-24	0.0000
Th-230	9.651E-05	0.0164	8.088E-07	0.0001	0.000E+00	0.0000	5.647E-05	0.0096	7.380E-07	0.0001	5.634E-07	0.0001	6.353E-06	0.0011
Th-232	1.041E-04	0.0177	1.902E-07	0.0000	0.000E+00	0.0000	5.151E-05	0.0087	6.141E-07	0.0001	7.474E-07	0.0001	2.320E-06	0.0004
U-234	2.321E-07	0.0000	6.419E-07	0.0001	0.000E+00	0.0000	1.186E-05	0.0020	1.623E-07	0.0000	3.967E-07	0.0001	6.235E-06	0.0011
U-235	5.898E-06	0.0010	1.322E-08	0.0000	0.000E+00	0.0000	2.776E-07	0.0000	4.222E-09	0.0000	9.001E-09	0.0000	1.454E-07	0.0000
U-238	1.691E-05	0.0029	1.626E-07	0.0000	0.000E+00	0.0000	4.632E-06	0.0008	6.340E-08	0.0000	1.554E-07	0.0000	2.562E-06	0.0004
Total	3.432E-03	0.5820	2.940E-06	0.0005	0.000E+00	0.0000	2.285E-03	0.3875	3.067E-05	0.0052	2.318E-05	0.0039	1.229E-04	0.0208

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.272E-07	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.553E-05	0.0077
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.479E-03	0.9293
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.472E-11	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.153E-21	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.614E-04	0.0274
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.595E-04	0.0270
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.953E-05	0.0033
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.348E-06	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.448E-05	0.0042
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.896E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.325E-04	5.136E-01	7.613E-04	5.740E-04	1.631E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.781E-01
Pa-231	2.567E-04	2.260E+00	2.002E-01	2.604E-04	1.801E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.640E+00
Pb-210	1.466E+00	1.294E+04	1.849E+02	8.973E+01	1.028E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.425E+04
Ra-226	1.471E+00	5.178E+04	6.261E+02	7.667E+02	1.032E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.421E+04
Ra-228	3.294E-02	1.155E+03	1.376E+01	1.696E+01	2.311E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.209E+03
Th-228	3.294E-02	4.341E+01	5.628E-01	3.741E-02	2.311E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.712E+01
Th-230	9.112E-01	8.027E+02	6.845E+00	4.883E-01	6.392E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.449E+03
Th-232	3.294E-02	2.902E+01	2.474E-01	1.765E-02	2.311E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.239E+01
U-234	1.717E+00	3.778E+03	5.171E+01	1.268E+02	1.204E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.161E+03
U-235	3.816E-02	8.399E+01	1.150E+00	2.818E+00	2.677E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.147E+02
U-238	5.316E-01	1.170E+03	1.602E+01	3.927E+01	3.730E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.598E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.221E-08	0.0000	1.529E-09	0.0000	1.056E-08	0.0000	1.562E-11	0.0000	1.180E-11	0.0000	5.955E-09	0.0000
Pa-231	9.660E-09	0.0000	3.665E-10	0.0000	1.602E-08	0.0000	1.420E-09	0.0000	1.846E-12	0.0000	2.113E-09	0.0000
Pb-210	1.642E-06	0.0003	5.950E-07	0.0001	1.332E-03	0.2345	1.903E-05	0.0034	9.235E-06	0.0016	8.109E-05	0.0143
Ra-226	3.182E-03	0.5602	5.105E-07	0.0001	7.979E-04	0.1405	9.647E-06	0.0017	1.181E-05	0.0021	2.254E-05	0.0040
Ra-228	3.806E-05	0.0067	5.166E-09	0.0000	5.056E-05	0.0089	6.025E-07	0.0001	7.426E-07	0.0001	1.587E-06	0.0003
Th-228	6.543E-05	0.0115	1.412E-07	0.0000	5.494E-07	0.0001	7.122E-09	0.0000	4.734E-10	0.0000	5.606E-07	0.0001
Th-230	1.952E-07	0.0000	7.788E-07	0.0001	2.865E-06	0.0005	2.443E-08	0.0000	1.743E-09	0.0000	3.872E-06	0.0007
Th-232	2.956E-09	0.0000	4.277E-08	0.0000	1.157E-07	0.0000	9.868E-10	0.0000	7.039E-11	0.0000	1.601E-07	0.0000
U-234	1.134E-07	0.0000	5.830E-07	0.0001	1.075E-05	0.0019	1.471E-07	0.0000	3.607E-07	0.0001	5.668E-06	0.0010
U-235	5.343E-06	0.0009	1.148E-08	0.0000	2.442E-07	0.0000	3.342E-09	0.0000	8.195E-09	0.0000	1.300E-07	0.0000
U-238	1.540E-05	0.0027	1.481E-07	0.0000	4.218E-06	0.0007	5.773E-08	0.0000	1.415E-07	0.0000	2.333E-06	0.0004
Total	3.308E-03	0.5824	2.818E-06	0.0005	2.199E-03	0.3872	2.952E-05	0.0052	2.230E-05	0.0039	1.179E-04	0.0208

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.103E-07	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.958E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.444E-03	0.2542
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.024E-03	0.7085
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.156E-05	0.0161
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.669E-05	0.0117
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.738E-06	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.226E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.762E-05	0.0031
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.740E-06	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-05	0.0039
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.680E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.220E-10	0.0000	5.340E-12	0.0000	0.000E+00	0.0000	3.673E-11	0.0000	2.957E-14	0.0000	4.108E-14	0.0000	2.079E-11	0.0000
Pb-210	9.773E-11	0.0000	3.541E-11	0.0000	0.000E+00	0.0000	7.902E-08	0.0000	1.121E-09	0.0000	5.460E-10	0.0000	4.826E-09	0.0000
Ra-226	2.931E-03	0.5161	1.023E-06	0.0002	0.000E+00	0.0000	1.972E-03	0.3471	2.655E-05	0.0047	1.945E-05	0.0034	9.605E-05	0.0169
Ra-228	1.550E-21	0.0000	2.469E-24	0.0000	0.000E+00	0.0000	5.865E-22	0.0000	7.091E-24	0.0000	8.568E-24	0.0000	2.764E-23	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.516E-04	0.0443	8.570E-07	0.0002	0.000E+00	0.0000	1.606E-04	0.0283	2.140E-06	0.0004	1.591E-06	0.0003	1.139E-05	0.0020
Th-232	1.035E-04	0.0182	1.892E-07	0.0000	0.000E+00	0.0000	5.122E-05	0.0090	6.106E-07	0.0001	7.432E-07	0.0001	2.307E-06	0.0004
U-234	8.654E-07	0.0002	5.875E-07	0.0001	0.000E+00	0.0000	1.121E-05	0.0020	1.532E-07	0.0000	3.652E-07	0.0001	5.710E-06	0.0010
U-235	5.445E-06	0.0010	1.337E-08	0.0000	0.000E+00	0.0000	2.708E-07	0.0000	4.778E-09	0.0000	8.209E-09	0.0000	1.380E-07	0.0000
U-238	1.540E-05	0.0027	1.482E-07	0.0000	0.000E+00	0.0000	4.221E-06	0.0007	5.777E-08	0.0000	1.416E-07	0.0000	2.335E-06	0.0004
Total	3.308E-03	0.5824	2.818E-06	0.0005	0.000E+00	0.0000	2.199E-03	0.3872	2.952E-05	0.0052	2.230E-05	0.0039	1.179E-04	0.0208

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.849E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.565E-08	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.046E-03	0.8884
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.183E-21	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.282E-04	0.0754
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.586E-04	0.0279
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.889E-05	0.0033
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.880E-06	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-05	0.0039
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.680E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					
Radio- Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	6.921E-04	1.529E+00	2.193E-03	1.708E-03	4.855E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.018E+00
Pa-231	7.103E-04	6.252E+00	5.541E-01	7.201E-04	4.983E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.305E+00
Pb-210	1.302E+00	1.150E+04	1.642E+02	7.970E+01	9.132E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.265E+04
Ra-226	1.308E+00	4.603E+04	5.566E+02	6.816E+02	9.173E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.819E+04
Ra-228	3.230E-02	1.132E+03	1.349E+01	1.663E+01	2.266E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.185E+03
Th-228	3.230E-02	4.257E+01	5.518E-01	3.668E-02	2.266E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.581E+01
Th-230	8.969E-01	7.901E+02	6.737E+00	4.806E-01	6.292E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.427E+03
Th-232	3.229E-02	2.845E+01	2.426E-01	1.731E-02	2.265E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.136E+01
U-234	1.237E+00	2.722E+03	3.725E+01	9.133E+01	8.675E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.718E+03
U-235	2.752E-02	6.058E+01	8.292E-01	2.033E+00	1.931E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.276E+01
U-238	3.835E-01	8.441E+02	1.155E+01	2.833E+01	2.690E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.153E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.646E-07	0.0001	4.389E-09	0.0000	3.029E-08	0.0000	4.345E-11	0.0000	3.385E-11	0.0000	1.709E-08	0.0000
Pa-231	2.584E-08	0.0000	9.803E-10	0.0000	4.286E-08	0.0000	3.798E-09	0.0000	4.936E-12	0.0000	5.653E-09	0.0000
Pb-210	1.459E-06	0.0003	5.287E-07	0.0001	1.184E-03	0.2340	1.691E-05	0.0033	8.206E-06	0.0016	7.205E-05	0.0142
Ra-226	2.830E-03	0.5595	4.540E-07	0.0001	7.096E-04	0.1403	8.580E-06	0.0017	1.051E-05	0.0021	2.004E-05	0.0040
Ra-228	3.732E-05	0.0074	5.065E-09	0.0000	4.957E-05	0.0098	5.907E-07	0.0001	7.281E-07	0.0001	1.556E-06	0.0003
Th-228	6.415E-05	0.0127	1.385E-07	0.0000	5.387E-07	0.0001	6.983E-09	0.0000	4.641E-10	0.0000	5.496E-07	0.0001
Th-230	1.921E-07	0.0000	7.665E-07	0.0002	2.820E-06	0.0006	2.404E-08	0.0000	1.715E-09	0.0000	3.811E-06	0.0008
Th-232	2.899E-09	0.0000	4.193E-08	0.0000	1.135E-07	0.0000	9.675E-10	0.0000	6.902E-11	0.0000	1.569E-07	0.0000
U-234	8.167E-08	0.0000	4.199E-07	0.0001	7.743E-06	0.0015	1.060E-07	0.0000	2.598E-07	0.0001	4.083E-06	0.0008
U-235	3.854E-06	0.0008	8.282E-09	0.0000	1.762E-07	0.0000	2.411E-09	0.0000	5.911E-09	0.0000	9.376E-08	0.0000
U-238	1.111E-05	0.0022	1.068E-07	0.0000	3.043E-06	0.0006	4.164E-08	0.0000	1.021E-07	0.0000	1.683E-06	0.0003
Total	2.948E-03	0.5829	2.475E-06	0.0005	1.957E-03	0.3869	2.626E-05	0.0052	1.981E-05	0.0039	1.040E-04	0.0206

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.165E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.913E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.283E-03	0.2536
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.579E-03	0.7076
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.977E-05	0.0177
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.539E-05	0.0129
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.616E-06	0.0015
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.163E-07	0.0001
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.269E-05	0.0025
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.141E-06	0.0008
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.608E-05	0.0032
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.058E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.442E-20	0.0000	1.069E-21	0.0000	0.000E+00	0.0000	7.349E-21	0.0000	5.916E-24	0.0000	8.220E-24	0.0000	4.161E-21	0.0000
Pb-210	2.821E-20	0.0000	1.022E-20	0.0000	0.000E+00	0.0000	2.281E-17	0.0000	3.234E-19	0.0000	1.576E-19	0.0000	1.393E-18	0.0000
Ra-226	2.138E-03	0.4226	7.457E-07	0.0001	0.000E+00	0.0000	1.438E-03	0.2842	1.936E-05	0.0038	1.419E-05	0.0028	7.004E-05	0.0138
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	6.877E-04	0.1360	9.894E-07	0.0002	0.000E+00	0.0000	4.541E-04	0.0898	6.094E-06	0.0012	4.487E-06	0.0009	2.560E-05	0.0051
Th-232	1.015E-04	0.0201	1.855E-07	0.0000	0.000E+00	0.0000	5.022E-05	0.0099	5.987E-07	0.0001	7.287E-07	0.0001	2.262E-06	0.0004
U-234	6.346E-06	0.0013	4.337E-07	0.0001	0.000E+00	0.0000	1.182E-05	0.0023	1.605E-07	0.0000	3.000E-07	0.0001	4.334E-06	0.0009
U-235	4.145E-06	0.0008	1.365E-08	0.0000	0.000E+00	0.0000	2.493E-07	0.0000	6.253E-09	0.0000	5.950E-09	0.0000	1.165E-07	0.0000
U-238	1.111E-05	0.0022	1.072E-07	0.0000	0.000E+00	0.0000	3.051E-06	0.0006	4.175E-08	0.0000	1.023E-07	0.0000	1.687E-06	0.0003
Total	2.948E-03	0.5829	2.475E-06	0.0005	0.000E+00	0.0000	1.957E-03	0.3869	2.626E-05	0.0052	1.981E-05	0.0039	1.040E-04	0.0206

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.702E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.472E-17	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.680E-03	0.7275
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E-03	0.2331
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.555E-04	0.0307
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.339E-05	0.0046
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.536E-06	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.610E-05	0.0032
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.058E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.713E-02	4.178E+01	1.257E-02	1.746E-02	1.238E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.419E+01
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	4.549E-02	4.437E+02	2.351E+00	1.146E+00	3.289E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.801E+02
Ra-226	2.034E-01	7.935E+03	3.585E+01	4.390E+01	1.470E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.161E+03
Th-230	4.827E-01	4.713E+02	1.502E+00	1.071E-01	3.490E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.219E+02
U-234	3.768E-01	9.191E+02	4.700E+00	1.152E+01	2.724E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.208E+03
U-235	2.569E-02	6.266E+01	3.204E-01	7.857E-01	1.857E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.234E+01
U-238	1.263E-01	3.081E+02	1.576E+00	3.863E+00	9.133E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.049E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0
Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0
Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.540E-06	0.0061	6.912E-08	0.0001	5.268E-07	0.0007	1.586E-10	0.0000	2.202E-10	0.0000	2.774E-07	0.0004
Pa-231	3.185E-10	0.0000	1.107E-11	0.0000	5.354E-10	0.0000	1.764E-11	0.0000	2.328E-14	0.0000	6.578E-11	0.0000
Pb-210	1.228E-07	0.0002	4.105E-08	0.0001	1.021E-04	0.1371	5.486E-07	0.0007	2.653E-07	0.0004	5.766E-06	0.0077
Ra-226	4.841E-04	0.6499	7.138E-08	0.0001	1.236E-04	0.1660	5.585E-07	0.0007	6.840E-07	0.0009	3.248E-06	0.0044
Th-230	1.130E-07	0.0002	4.125E-07	0.0006	1.682E-06	0.0023	5.358E-09	0.0000	3.822E-10	0.0000	2.114E-06	0.0028
U-234	2.715E-08	0.0000	1.279E-07	0.0002	2.615E-06	0.0035	1.337E-08	0.0000	3.278E-08	0.0000	1.282E-06	0.0017
U-235	3.931E-06	0.0053	7.729E-09	0.0000	1.822E-07	0.0002	9.318E-10	0.0000	2.285E-09	0.0000	9.020E-08	0.0001
U-238	3.980E-06	0.0053	3.518E-08	0.0000	1.111E-06	0.0015	5.680E-09	0.0000	1.393E-08	0.0000	5.713E-07	0.0008
Total	4.969E-04	0.6669	7.650E-07	0.0010	2.319E-04	0.3113	1.133E-06	0.0015	9.989E-07	0.0013	1.335E-05	0.0179

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.414E-06	0.0073
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.484E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.089E-04	0.1462
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.123E-04	0.8219
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.327E-06	0.0058
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.098E-06	0.0055
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.214E-06	0.0057
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.717E-06	0.0077
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.450E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.539E-06	0.0061	6.911E-08	0.0001	0.000E+00	0.0000	5.267E-07	0.0007	1.584E-10	0.0000	2.201E-10	0.0000	2.774E-07	0.0004
Pb-210	3.588E-08	0.0000	1.200E-08	0.0000	0.000E+00	0.0000	2.967E-05	0.0398	1.572E-07	0.0002	7.660E-08	0.0001	1.685E-06	0.0023
Ra-226	4.769E-04	0.6401	9.903E-08	0.0001	0.000E+00	0.0000	1.934E-04	0.2596	9.372E-07	0.0013	8.603E-07	0.0012	7.235E-06	0.0097
Th-230	7.482E-06	0.0100	4.139E-07	0.0006	0.000E+00	0.0000	4.355E-06	0.0058	1.811E-08	0.0000	1.281E-08	0.0000	2.208E-06	0.0030
U-234	2.768E-08	0.0000	1.280E-07	0.0002	0.000E+00	0.0000	2.615E-06	0.0035	1.337E-08	0.0000	3.278E-08	0.0000	1.282E-06	0.0017
U-235	3.932E-06	0.0053	7.753E-09	0.0000	0.000E+00	0.0000	1.828E-07	0.0002	9.495E-10	0.0000	2.285E-09	0.0000	9.032E-08	0.0001
U-238	3.980E-06	0.0053	3.518E-08	0.0000	0.000E+00	0.0000	1.111E-06	0.0015	5.680E-09	0.0000	1.393E-08	0.0000	5.714E-07	0.0008
Total	4.969E-04	0.6669	7.650E-07	0.0010	0.000E+00	0.0000	2.319E-04	0.3113	1.133E-06	0.0015	9.989E-07	0.0013	1.335E-05	0.0179

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.413E-06	0.0073
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.164E-05	0.0425
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.794E-04	0.9120
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.449E-05	0.0194
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.099E-06	0.0055
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.216E-06	0.0057
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.717E-06	0.0077
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.450E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.659E-02	4.046E+01	1.217E-02	1.691E-02	1.199E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.249E+01
Pa-231	5.434E-07	5.160E-03	1.569E-04	2.619E-07	3.929E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.710E-03
Pb-210	5.031E-02	4.973E+02	2.713E+00	1.301E+00	3.638E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.377E+02
Ra-226	2.035E-01	7.939E+03	3.586E+01	4.392E+01	1.471E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.166E+03
Th-230	4.827E-01	4.713E+02	1.502E+00	1.071E-01	3.490E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.219E+02
U-234	3.766E-01	9.187E+02	4.698E+00	1.152E+01	2.723E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.207E+03
U-235	2.568E-02	6.264E+01	3.203E-01	7.853E-01	1.857E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.231E+01
U-238	1.262E-01	3.080E+02	1.575E+00	3.861E+00	9.128E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.047E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.398E-06	0.0059	6.695E-08	0.0001	5.103E-07	0.0007	1.536E-10	0.0000	2.133E-10	0.0000	2.687E-07	0.0004
Pa-231	3.396E-10	0.0000	1.180E-11	0.0000	5.710E-10	0.0000	1.881E-11	0.0000	2.484E-14	0.0000	7.015E-11	0.0000
Pb-210	1.266E-07	0.0002	4.234E-08	0.0001	1.054E-04	0.1408	5.665E-07	0.0008	2.739E-07	0.0004	5.947E-06	0.0079
Ra-226	4.844E-04	0.6471	7.142E-08	0.0001	1.237E-04	0.1653	5.589E-07	0.0007	6.843E-07	0.0009	3.250E-06	0.0043
Th-230	1.130E-07	0.0002	4.125E-07	0.0006	1.682E-06	0.0022	5.358E-09	0.0000	3.822E-10	0.0000	2.114E-06	0.0028
U-234	2.714E-08	0.0000	1.279E-07	0.0002	2.614E-06	0.0035	1.337E-08	0.0000	3.277E-08	0.0000	1.282E-06	0.0017
U-235	3.929E-06	0.0052	7.726E-09	0.0000	1.821E-07	0.0002	9.313E-10	0.0000	2.283E-09	0.0000	9.016E-08	0.0001
U-238	3.978E-06	0.0053	3.516E-08	0.0000	1.110E-06	0.0015	5.677E-09	0.0000	1.392E-08	0.0000	5.711E-07	0.0008
Total	4.970E-04	0.6639	7.640E-07	0.0010	2.352E-04	0.3142	1.151E-06	0.0015	1.008E-06	0.0013	1.352E-05	0.0181

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.244E-06	0.0070
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.011E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.123E-04	0.1501
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.127E-04	0.8184
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.327E-06	0.0058
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.096E-06	0.0055
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.213E-06	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.714E-06	0.0076
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.486E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.397E-06	0.0059	6.694E-08	0.0001	0.000E+00	0.0000	5.102E-07	0.0007	1.535E-10	0.0000	2.132E-10	0.0000	2.686E-07	0.0004
Pb-210	3.477E-08	0.0000	1.163E-08	0.0000	0.000E+00	0.0000	2.875E-05	0.0384	1.524E-07	0.0002	7.424E-08	0.0001	1.633E-06	0.0022
Ra-226	4.766E-04	0.6367	1.006E-07	0.0001	0.000E+00	0.0000	1.975E-04	0.2638	9.592E-07	0.0013	8.707E-07	0.0012	7.462E-06	0.0100
Th-230	7.972E-06	0.0106	4.140E-07	0.0006	0.000E+00	0.0000	4.555E-06	0.0061	1.908E-08	0.0000	1.369E-08	0.0000	2.216E-06	0.0030
U-234	2.772E-08	0.0000	1.279E-07	0.0002	0.000E+00	0.0000	2.614E-06	0.0035	1.337E-08	0.0000	3.277E-08	0.0000	1.282E-06	0.0017
U-235	3.931E-06	0.0053	7.752E-09	0.0000	0.000E+00	0.0000	1.828E-07	0.0002	9.503E-10	0.0000	2.284E-09	0.0000	9.028E-08	0.0001
U-238	3.978E-06	0.0053	3.517E-08	0.0000	0.000E+00	0.0000	1.110E-06	0.0015	5.677E-09	0.0000	1.392E-08	0.0000	5.711E-07	0.0008
Total	4.970E-04	0.6639	7.640E-07	0.0010	0.000E+00	0.0000	2.352E-04	0.3142	1.151E-06	0.0015	1.008E-06	0.0013	1.352E-05	0.0181

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.243E-06	0.0070
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.066E-05	0.0410
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.835E-04	0.9130
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-05	0.0203
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.098E-06	0.0055
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.215E-06	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.714E-06	0.0076
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.486E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.556E-02	3.796E+01	1.142E-02	1.587E-02	1.125E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.924E+01
Pa-231	1.629E-06	1.575E-02	5.077E-04	7.177E-07	1.178E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.744E-02
Pb-210	5.952E-02	5.871E+02	3.189E+00	1.533E+00	4.304E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.349E+02
Ra-226	2.037E-01	7.948E+03	3.590E+01	4.397E+01	1.473E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.175E+03
Th-230	4.827E-01	4.712E+02	1.501E+00	1.071E-01	3.490E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.219E+02
U-234	3.762E-01	9.178E+02	4.693E+00	1.151E+01	2.720E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.206E+03
U-235	2.565E-02	6.258E+01	3.200E-01	7.846E-01	1.855E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.223E+01
U-238	1.261E-01	3.077E+02	1.573E+00	3.858E+00	9.120E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.043E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.126E-06	0.0055	6.282E-08	0.0001	4.788E-07	0.0006	1.441E-10	0.0000	2.001E-10	0.0000	2.521E-07	0.0003
Pa-231	3.819E-10	0.0000	1.327E-11	0.0000	6.422E-10	0.0000	2.117E-11	0.0000	2.790E-14	0.0000	7.889E-11	0.0000
Pb-210	1.340E-07	0.0002	4.480E-08	0.0001	1.115E-04	0.1475	5.987E-07	0.0008	2.896E-07	0.0004	6.293E-06	0.0083
Ra-226	4.850E-04	0.6419	7.150E-08	0.0001	1.239E-04	0.1639	5.595E-07	0.0007	6.851E-07	0.0009	3.254E-06	0.0043
Th-230	1.129E-07	0.0001	4.125E-07	0.0005	1.682E-06	0.0022	5.358E-09	0.0000	3.822E-10	0.0000	2.114E-06	0.0028
U-234	2.711E-08	0.0000	1.278E-07	0.0002	2.611E-06	0.0035	1.335E-08	0.0000	3.274E-08	0.0000	1.280E-06	0.0017
U-235	3.926E-06	0.0052	7.718E-09	0.0000	1.819E-07	0.0002	9.305E-10	0.0000	2.281E-09	0.0000	9.007E-08	0.0001
U-238	3.974E-06	0.0053	3.513E-08	0.0000	1.109E-06	0.0015	5.672E-09	0.0000	1.391E-08	0.0000	5.705E-07	0.0008
Total	4.973E-04	0.6582	7.622E-07	0.0010	2.414E-04	0.3195	1.184E-06	0.0016	1.024E-06	0.0014	1.385E-05	0.0183

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.920E-06	0.0065
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.137E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.188E-04	0.1573
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.134E-04	0.8119
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.327E-06	0.0057
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.093E-06	0.0054
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.209E-06	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.709E-06	0.0076
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.555E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.125E-06	0.0055	6.280E-08	0.0001	0.000E+00	0.0000	4.787E-07	0.0006	1.440E-10	0.0000	2.001E-10	0.0000	2.520E-07	0.0003
Pb-210	3.266E-08	0.0000	1.092E-08	0.0000	0.000E+00	0.0000	2.700E-05	0.0357	1.431E-07	0.0002	6.972E-08	0.0001	1.534E-06	0.0020
Ra-226	4.762E-04	0.6304	1.037E-07	0.0001	0.000E+00	0.0000	2.050E-04	0.2714	9.994E-07	0.0013	8.899E-07	0.0012	7.895E-06	0.0105
Th-230	8.951E-06	0.0118	4.142E-07	0.0005	0.000E+00	0.0000	4.969E-06	0.0066	2.109E-08	0.0000	1.550E-08	0.0000	2.231E-06	0.0030
U-234	2.781E-08	0.0000	1.278E-07	0.0002	0.000E+00	0.0000	2.611E-06	0.0035	1.335E-08	0.0000	3.274E-08	0.0000	1.281E-06	0.0017
U-235	3.927E-06	0.0052	7.749E-09	0.0000	0.000E+00	0.0000	1.827E-07	0.0002	9.518E-10	0.0000	2.281E-09	0.0000	9.022E-08	0.0001
U-238	3.974E-06	0.0053	3.513E-08	0.0000	0.000E+00	0.0000	1.109E-06	0.0015	5.672E-09	0.0000	1.391E-08	0.0000	5.706E-07	0.0008
Total	4.973E-04	0.6582	7.622E-07	0.0010	0.000E+00	0.0000	2.414E-04	0.3195	1.184E-06	0.0016	1.024E-06	0.0014	1.385E-05	0.0183

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.919E-06	0.0065
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.879E-05	0.0381
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.911E-04	0.9148
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.660E-05	0.0220
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.094E-06	0.0054
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.211E-06	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.709E-06	0.0076
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.555E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.245E-02	3.037E+01	9.138E-03	1.269E-02	9.001E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.939E+01
Pa-231	5.420E-06	5.273E-02	1.732E-03	2.309E-06	3.919E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.839E-02
Pb-210	8.766E-02	8.617E+02	4.644E+00	2.242E+00	6.338E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.319E+02
Ra-226	2.045E-01	7.980E+03	3.605E+01	4.414E+01	1.479E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.208E+03
Th-230	4.826E-01	4.711E+02	1.501E+00	1.071E-01	3.489E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.217E+02
U-234	3.750E-01	9.148E+02	4.678E+00	1.147E+01	2.712E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.202E+03
U-235	2.557E-02	6.237E+01	3.190E-01	7.821E-01	1.849E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.196E+01
U-238	1.257E-01	3.067E+02	1.568E+00	3.845E+00	9.090E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.030E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.301E-06	0.0042	5.026E-08	0.0001	3.831E-07	0.0005	1.154E-10	0.0000	1.601E-10	0.0000	2.017E-07	0.0003
Pa-231	5.296E-10	0.0000	1.841E-11	0.0000	8.909E-10	0.0000	2.941E-11	0.0000	3.860E-14	0.0000	1.094E-10	0.0000
Pb-210	1.565E-07	0.0002	5.234E-08	0.0001	1.301E-04	0.1675	6.975E-07	0.0009	3.377E-07	0.0004	7.351E-06	0.0095
Ra-226	4.869E-04	0.6268	7.178E-08	0.0001	1.243E-04	0.1601	5.617E-07	0.0007	6.878E-07	0.0009	3.267E-06	0.0042
Th-230	1.129E-07	0.0001	4.124E-07	0.0005	1.681E-06	0.0022	5.357E-09	0.0000	3.821E-10	0.0000	2.114E-06	0.0027
U-234	2.703E-08	0.0000	1.274E-07	0.0002	2.603E-06	0.0034	1.331E-08	0.0000	3.263E-08	0.0000	1.276E-06	0.0016
U-235	3.913E-06	0.0050	7.693E-09	0.0000	1.814E-07	0.0002	9.274E-10	0.0000	2.274E-09	0.0000	8.978E-08	0.0001
U-238	3.961E-06	0.0051	3.502E-08	0.0000	1.105E-06	0.0014	5.653E-09	0.0000	1.386E-08	0.0000	5.687E-07	0.0007
Total	4.984E-04	0.6416	7.569E-07	0.0010	2.604E-04	0.3353	1.285E-06	0.0017	1.075E-06	0.0014	1.487E-05	0.0191

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.936E-06	0.0051
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.578E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.387E-04	0.1786
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.158E-04	0.7928
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.326E-06	0.0056
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.079E-06	0.0053
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.195E-06	0.0054
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.690E-06	0.0073
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.767E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.299E-06	0.0042	5.023E-08	0.0001	0.000E+00	0.0000	3.829E-07	0.0005	1.152E-10	0.0000	1.600E-10	0.0000	2.016E-07	0.0003
Pb-210	2.622E-08	0.0000	8.767E-09	0.0000	0.000E+00	0.0000	2.168E-05	0.0279	1.149E-07	0.0001	5.597E-08	0.0001	1.231E-06	0.0016
Ra-226	4.748E-04	0.6112	1.129E-07	0.0001	0.000E+00	0.0000	2.279E-04	0.2934	1.121E-06	0.0014	9.478E-07	0.0012	9.208E-06	0.0119
Th-230	1.237E-05	0.0159	4.148E-07	0.0005	0.000E+00	0.0000	6.529E-06	0.0084	2.874E-08	0.0000	2.212E-08	0.0000	2.292E-06	0.0030
U-234	2.825E-08	0.0000	1.274E-07	0.0002	0.000E+00	0.0000	2.603E-06	0.0034	1.331E-08	0.0000	3.263E-08	0.0000	1.277E-06	0.0016
U-235	3.915E-06	0.0050	7.740E-09	0.0000	0.000E+00	0.0000	1.825E-07	0.0002	9.571E-10	0.0000	2.274E-09	0.0000	9.000E-08	0.0001
U-238	3.961E-06	0.0051	3.502E-08	0.0000	0.000E+00	0.0000	1.106E-06	0.0014	5.653E-09	0.0000	1.386E-08	0.0000	5.687E-07	0.0007
Total	4.984E-04	0.6416	7.569E-07	0.0010	0.000E+00	0.0000	2.604E-04	0.3353	1.285E-06	0.0017	1.075E-06	0.0014	1.487E-05	0.0191

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.934E-06	0.0051
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.312E-05	0.0298
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.141E-04	0.9193
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.166E-05	0.0279
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.081E-06	0.0053
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.199E-06	0.0054
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.690E-06	0.0073
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.767E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	6.582E-03	1.606E+01	4.839E-03	6.711E-03	4.759E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.083E+01
Pa-231	1.617E-05	1.576E-01	5.206E-03	6.822E-06	1.169E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.745E-01
Pb-210	1.418E-01	1.390E+03	7.445E+00	3.607E+00	1.026E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.504E+03
Ra-226	2.069E-01	8.071E+03	3.646E+01	4.465E+01	1.496E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.301E+03
Th-230	4.823E-01	4.709E+02	1.500E+00	1.070E-01	3.487E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.212E+02
U-234	3.715E-01	9.063E+02	4.634E+00	1.136E+01	2.686E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.191E+03
U-235	2.533E-02	6.179E+01	3.160E-01	7.748E-01	1.832E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.120E+01
U-238	1.245E-01	3.038E+02	1.554E+00	3.809E+00	9.006E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.992E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.748E-06	0.0021	2.661E-08	0.0000	2.028E-07	0.0002	6.128E-11	0.0000	8.477E-11	0.0000	1.068E-07	0.0001
Pa-231	9.485E-10	0.0000	3.296E-11	0.0000	1.596E-09	0.0000	5.276E-11	0.0000	6.895E-14	0.0000	1.959E-10	0.0000
Pb-210	2.002E-07	0.0002	6.695E-08	0.0001	1.663E-04	0.2027	8.892E-07	0.0011	4.311E-07	0.0005	9.404E-06	0.0115
Ra-226	4.923E-04	0.6003	7.259E-08	0.0001	1.257E-04	0.1533	5.680E-07	0.0007	6.955E-07	0.0008	3.303E-06	0.0040
Th-230	1.129E-07	0.0001	4.122E-07	0.0005	1.680E-06	0.0020	5.353E-09	0.0000	3.819E-10	0.0000	2.112E-06	0.0026
U-234	2.677E-08	0.0000	1.262E-07	0.0002	2.578E-06	0.0031	1.318E-08	0.0000	3.233E-08	0.0000	1.264E-06	0.0015
U-235	3.876E-06	0.0047	7.622E-09	0.0000	1.797E-07	0.0002	9.188E-10	0.0000	2.253E-09	0.0000	8.894E-08	0.0001
U-238	3.924E-06	0.0048	3.469E-08	0.0000	1.095E-06	0.0013	5.601E-09	0.0000	1.373E-08	0.0000	5.634E-07	0.0007
Total	5.022E-04	0.6123	7.468E-07	0.0009	2.977E-04	0.3630	1.482E-06	0.0018	1.175E-06	0.0014	1.684E-05	0.0205

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.084E-06	0.0025
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.826E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.773E-04	0.2161
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.227E-04	0.7592
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.323E-06	0.0053
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.041E-06	0.0049
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.156E-06	0.0051
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.637E-06	0.0069
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.202E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.743E-06	0.0021	2.654E-08	0.0000	0.000E+00	0.0000	2.023E-07	0.0002	6.084E-11	0.0000	8.454E-11	0.0000	1.065E-07	0.0001
Pb-210	1.400E-08	0.0000	4.680E-09	0.0000	0.000E+00	0.0000	1.157E-05	0.0141	6.133E-08	0.0001	2.988E-08	0.0000	6.574E-07	0.0008
Ra-226	4.705E-04	0.5737	1.298E-07	0.0002	0.000E+00	0.0000	2.704E-04	0.3297	1.347E-06	0.0016	1.054E-06	0.0013	1.165E-05	0.0142
Th-230	2.208E-05	0.0269	4.170E-07	0.0005	0.000E+00	0.0000	1.169E-05	0.0143	5.434E-08	0.0001	4.281E-08	0.0001	2.508E-06	0.0031
U-234	3.039E-08	0.0000	1.263E-07	0.0002	0.000E+00	0.0000	2.580E-06	0.0031	1.319E-08	0.0000	3.233E-08	0.0000	1.265E-06	0.0015
U-235	3.882E-06	0.0047	7.727E-09	0.0000	0.000E+00	0.0000	1.818E-07	0.0002	9.720E-10	0.0000	2.253E-09	0.0000	8.943E-08	0.0001
U-238	3.924E-06	0.0048	3.470E-08	0.0000	0.000E+00	0.0000	1.095E-06	0.0013	5.601E-09	0.0000	1.373E-08	0.0000	5.635E-07	0.0007
Total	5.022E-04	0.6123	7.468E-07	0.0009	0.000E+00	0.0000	2.977E-04	0.3630	1.482E-06	0.0018	1.175E-06	0.0014	1.684E-05	0.0205

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.079E-06	0.0025
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.234E-05	0.0150
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.551E-04	0.9207
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.680E-05	0.0449
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.047E-06	0.0049
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.164E-06	0.0051
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.637E-06	0.0069
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.202E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	7.420E-04	1.810E+00	5.742E-04	7.566E-04	5.365E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.348E+00
Pa-231	5.288E-05	5.158E-01	1.707E-02	2.223E-05	3.824E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.711E-01
Pb-210	2.026E-01	1.983E+03	1.059E+01	5.139E+00	1.465E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.145E+03
Ra-226	2.148E-01	8.381E+03	3.786E+01	4.636E+01	1.553E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.620E+03
Th-230	4.813E-01	4.699E+02	1.497E+00	1.068E-01	3.480E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.195E+02
U-234	3.595E-01	8.770E+02	4.485E+00	1.100E+01	2.600E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.152E+03
U-235	2.452E-02	5.981E+01	3.058E-01	7.499E-01	1.773E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.859E+01
U-238	1.205E-01	2.941E+02	1.504E+00	3.687E+00	8.716E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.864E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.052E-07	0.0002	3.124E-09	0.0000	2.382E-08	0.0000	7.831E-12	0.0000	9.956E-12	0.0000	1.254E-08	0.0000
Pa-231	2.379E-09	0.0000	8.266E-11	0.0000	4.004E-09	0.0000	1.325E-10	0.0000	1.726E-13	0.0000	4.913E-10	0.0000
Pb-210	2.515E-07	0.0003	8.410E-08	0.0001	2.087E-04	0.2354	1.114E-06	0.0013	5.407E-07	0.0006	1.181E-05	0.0133
Ra-226	5.110E-04	0.5762	7.533E-08	0.0001	1.305E-04	0.1472	5.895E-07	0.0007	7.218E-07	0.0008	3.428E-06	0.0039
Th-230	1.126E-07	0.0001	4.113E-07	0.0005	1.677E-06	0.0019	5.342E-09	0.0000	3.811E-10	0.0000	2.108E-06	0.0024
U-234	2.591E-08	0.0000	1.221E-07	0.0001	2.495E-06	0.0028	1.276E-08	0.0000	3.128E-08	0.0000	1.224E-06	0.0014
U-235	3.752E-06	0.0042	7.377E-09	0.0000	1.739E-07	0.0002	8.893E-10	0.0000	2.180E-09	0.0000	8.609E-08	0.0001
U-238	3.798E-06	0.0043	3.358E-08	0.0000	1.060E-06	0.0012	5.421E-09	0.0000	1.329E-08	0.0000	5.453E-07	0.0006
Total	5.191E-04	0.5854	7.370E-07	0.0008	3.446E-04	0.3887	1.728E-06	0.0019	1.310E-06	0.0015	1.922E-05	0.0217

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.447E-07	0.0003
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.090E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.225E-04	0.2509
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.463E-04	0.7288
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.314E-06	0.0049
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.911E-06	0.0044
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.022E-06	0.0045
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.456E-06	0.0062
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.867E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.868E-07	0.0002	2.844E-09	0.0000	0.000E+00	0.0000	2.168E-08	0.0000	6.521E-12	0.0000	9.061E-12	0.0000	1.142E-08	0.0000
Pb-210	1.556E-09	0.0000	5.204E-10	0.0000	0.000E+00	0.0000	1.287E-06	0.0015	6.818E-09	0.0000	3.322E-09	0.0000	7.309E-08	0.0001
Ra-226	4.560E-04	0.5142	1.438E-07	0.0002	0.000E+00	0.0000	3.066E-04	0.3458	1.541E-06	0.0017	1.137E-06	0.0013	1.383E-05	0.0156
Th-230	5.532E-05	0.0624	4.260E-07	0.0005	0.000E+00	0.0000	3.297E-05	0.0372	1.610E-07	0.0002	1.229E-07	0.0001	3.449E-06	0.0039
U-234	4.822E-08	0.0001	1.224E-07	0.0001	0.000E+00	0.0000	2.507E-06	0.0028	1.282E-08	0.0000	3.133E-08	0.0000	1.226E-06	0.0014
U-235	3.773E-06	0.0043	7.739E-09	0.0000	0.000E+00	0.0000	1.800E-07	0.0002	1.023E-09	0.0000	2.181E-09	0.0000	8.770E-08	0.0001
U-238	3.798E-06	0.0043	3.359E-08	0.0000	0.000E+00	0.0000	1.060E-06	0.0012	5.422E-09	0.0000	1.329E-08	0.0000	5.454E-07	0.0006
Total	5.191E-04	0.5854	7.370E-07	0.0008	0.000E+00	0.0000	3.446E-04	0.3887	1.728E-06	0.0019	1.310E-06	0.0015	1.922E-05	0.0217

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.228E-07	0.0003
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-06	0.0015
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.792E-04	0.8788
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.245E-05	0.1043
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.948E-06	0.0045
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.051E-06	0.0046
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.456E-06	0.0062
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.867E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.365E-04	3.342E-01	1.848E-04	1.395E-04	9.869E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.332E-01
Pa-231	1.503E-04	1.466E+00	4.852E-02	6.310E-05	1.087E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.623E+00
Pb-210	2.305E-01	2.257E+03	1.205E+01	5.846E+00	1.667E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.441E+03
Ra-226	2.360E-01	9.209E+03	4.160E+01	5.094E+01	1.707E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.472E+03
Th-230	4.783E-01	4.670E+02	1.488E+00	1.061E-01	3.459E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.144E+02
U-234	3.274E-01	7.986E+02	4.084E+00	1.001E+01	2.367E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.049E+03
U-235	2.233E-02	5.448E+01	2.786E-01	6.831E-01	1.615E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.159E+01
U-238	1.098E-01	2.679E+02	1.370E+00	3.358E+00	7.939E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.520E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	5.890E-08	0.0001	8.968E-10	0.0000	6.861E-09	0.0000	3.790E-12	0.0000	2.865E-12	0.0000	3.599E-09	0.0000
Pa-231	6.172E-09	0.0000	2.145E-10	0.0000	1.039E-08	0.0000	3.440E-10	0.0000	4.474E-13	0.0000	1.275E-09	0.0000
Pb-210	2.825E-07	0.0003	9.447E-08	0.0001	2.344E-04	0.2403	1.251E-06	0.0013	6.073E-07	0.0006	1.327E-05	0.0136
Ra-226	5.606E-04	0.5747	8.266E-08	0.0001	1.432E-04	0.1468	6.468E-07	0.0007	7.920E-07	0.0008	3.761E-06	0.0039
Th-230	1.119E-07	0.0001	4.088E-07	0.0004	1.666E-06	0.0017	5.309E-09	0.0000	3.788E-10	0.0000	2.095E-06	0.0021
U-234	2.359E-08	0.0000	1.112E-07	0.0001	2.272E-06	0.0023	1.162E-08	0.0000	2.849E-08	0.0000	1.114E-06	0.0011
U-235	3.418E-06	0.0035	6.719E-09	0.0000	1.584E-07	0.0002	8.100E-10	0.0000	1.986E-09	0.0000	7.841E-08	0.0001
U-238	3.460E-06	0.0035	3.058E-08	0.0000	9.655E-07	0.0010	4.938E-09	0.0000	1.211E-08	0.0000	4.967E-07	0.0005
Total	5.680E-04	0.5822	7.355E-07	0.0008	3.827E-04	0.3922	1.921E-06	0.0020	1.442E-06	0.0015	2.082E-05	0.0213

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.027E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.840E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.499E-04	0.2562
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.091E-04	0.7268
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.288E-06	0.0044
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.561E-06	0.0036
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.664E-06	0.0038
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.970E-06	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.756E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.165E-10	0.0000	4.818E-12	0.0000	0.000E+00	0.0000	3.673E-11	0.0000	1.105E-14	0.0000	1.535E-14	0.0000	1.934E-11	0.0000
Pb-210	2.927E-12	0.0000	9.788E-13	0.0000	0.000E+00	0.0000	2.420E-09	0.0000	1.282E-11	0.0000	6.249E-12	0.0000	1.375E-10	0.0000
Ra-226	4.166E-04	0.4271	1.336E-07	0.0001	0.000E+00	0.0000	2.854E-04	0.2926	1.436E-06	0.0015	1.052E-06	0.0011	1.293E-05	0.0133
Th-230	1.442E-04	0.1479	4.514E-07	0.0005	0.000E+00	0.0000	9.374E-05	0.0961	4.668E-07	0.0005	3.471E-07	0.0004	6.186E-06	0.0063
U-234	1.796E-07	0.0002	1.120E-07	0.0001	0.000E+00	0.0000	2.369E-06	0.0024	1.210E-08	0.0000	2.884E-08	0.0000	1.122E-06	0.0012
U-235	3.482E-06	0.0036	7.826E-09	0.0000	0.000E+00	0.0000	1.756E-07	0.0002	1.158E-09	0.0000	1.989E-09	0.0000	8.327E-08	0.0001
U-238	3.460E-06	0.0035	3.062E-08	0.0000	0.000E+00	0.0000	9.662E-07	0.0010	4.941E-09	0.0000	1.211E-08	0.0000	4.970E-07	0.0005
Total	5.680E-04	0.5822	7.355E-07	0.0008	0.000E+00	0.0000	3.827E-04	0.3922	1.921E-06	0.0020	1.442E-06	0.0015	2.082E-05	0.0213

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.774E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.581E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.176E-04	0.7356
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.454E-04	0.2516
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.824E-06	0.0039
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.752E-06	0.0038
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.971E-06	0.0051
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.756E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.051E-04	9.916E-01	5.315E-04	4.140E-04	2.929E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.285E+00
Pa-231	4.157E-04	4.055E+00	1.343E-01	1.745E-04	3.006E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.491E+00
Pb-210	2.900E-01	2.839E+03	1.515E+01	7.354E+00	2.097E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.071E+03
Ra-226	2.950E-01	1.151E+04	5.200E+01	6.368E+01	2.133E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.184E+04
Th-230	4.678E-01	4.567E+02	1.455E+00	1.038E-01	3.382E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.965E+02
U-234	2.358E-01	5.753E+02	2.942E+00	7.213E+00	1.705E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.559E+02
U-235	1.611E-02	3.930E+01	2.010E-01	4.927E-01	1.165E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.164E+01
U-238	7.920E-02	1.932E+02	9.880E-01	2.423E+00	5.727E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.539E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.687E-07	0.0001	2.569E-09	0.0000	1.965E-08	0.0000	1.053E-11	0.0000	8.204E-12	0.0000	1.031E-08	0.0000
Pa-231	1.651E-08	0.0000	5.737E-10	0.0000	2.780E-08	0.0000	9.205E-10	0.0000	1.196E-12	0.0000	3.410E-09	0.0000
Pb-210	3.544E-07	0.0003	1.185E-07	0.0001	2.940E-04	0.2429	1.569E-06	0.0013	7.616E-07	0.0006	1.664E-05	0.0137
Ra-226	6.989E-04	0.5773	1.030E-07	0.0001	1.785E-04	0.1474	8.063E-07	0.0007	9.873E-07	0.0008	4.689E-06	0.0039
Th-230	1.095E-07	0.0001	3.997E-07	0.0003	1.630E-06	0.0013	5.192E-09	0.0000	3.704E-10	0.0000	2.049E-06	0.0017
U-234	1.699E-08	0.0000	8.009E-08	0.0001	1.637E-06	0.0014	8.369E-09	0.0000	2.052E-08	0.0000	8.026E-07	0.0007
U-235	2.465E-06	0.0020	4.847E-09	0.0000	1.143E-07	0.0001	5.843E-10	0.0000	1.433E-09	0.0000	5.656E-08	0.0000
U-238	2.496E-06	0.0021	2.206E-08	0.0000	6.965E-07	0.0006	3.562E-09	0.0000	8.732E-09	0.0000	3.583E-07	0.0003
Total	7.045E-04	0.5819	7.314E-07	0.0006	4.766E-04	0.3937	2.394E-06	0.0020	1.780E-06	0.0015	2.461E-05	0.0203

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.013E-07	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.921E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.135E-04	0.2589
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.839E-04	0.7301
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.193E-06	0.0035
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.565E-06	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.643E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.585E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.211E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.332E-20	0.0000	9.641E-22	0.0000	0.000E+00	0.0000	7.348E-21	0.0000	2.210E-24	0.0000	3.071E-24	0.0000	3.869E-21	0.0000
Pb-210	8.449E-22	0.0000	2.825E-22	0.0000	0.000E+00	0.0000	6.986E-19	0.0000	3.702E-21	0.0000	1.804E-21	0.0000	3.968E-20	0.0000
Ra-226	3.038E-04	0.2510	9.740E-08	0.0001	0.000E+00	0.0000	2.081E-04	0.1719	1.047E-06	0.0009	7.673E-07	0.0006	9.430E-06	0.0078
Th-230	3.942E-04	0.3256	5.212E-07	0.0004	0.000E+00	0.0000	2.651E-04	0.2190	1.329E-06	0.0011	9.789E-07	0.0008	1.390E-05	0.0115
U-234	1.317E-06	0.0011	8.270E-08	0.0001	0.000E+00	0.0000	2.498E-06	0.0021	1.268E-08	0.0000	2.369E-08	0.0000	8.518E-07	0.0007
U-235	2.650E-06	0.0022	7.990E-09	0.0000	0.000E+00	0.0000	1.617E-07	0.0001	1.515E-09	0.0000	1.442E-09	0.0000	7.028E-08	0.0001
U-238	2.496E-06	0.0021	2.214E-08	0.0000	0.000E+00	0.0000	6.983E-07	0.0006	3.571E-09	0.0000	8.753E-09	0.0000	3.591E-07	0.0003
Total	7.045E-04	0.5819	7.314E-07	0.0006	0.000E+00	0.0000	4.766E-04	0.3937	2.394E-06	0.0020	1.780E-06	0.0015	2.461E-05	0.0203

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.551E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.449E-19	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.233E-04	0.4322
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.761E-04	0.5584
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.786E-06	0.0040
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.893E-06	0.0024
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.588E-06	0.0030
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.211E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0

Menu	Parameter	Current Value	Default	Parameter Name
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	3.452E-02	8.094E+01	3.553E-02	4.936E-02	2.580E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.068E+02
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	2.146E+00	2.013E+04	1.556E+02	7.582E+01	1.604E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.196E+04
Ra-226	1.055E+00	3.957E+04	2.609E+02	3.194E+02	7.885E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.094E+04
Th-230	1.495E+00	1.403E+03	6.522E+00	4.653E-01	1.117E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.527E+03
U-234	4.477E+00	1.050E+04	7.833E+01	1.921E+02	3.346E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.411E+04
U-235	1.542E-01	3.616E+02	2.698E+00	6.616E+00	1.153E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.862E+02
U-238	1.097E+00	2.573E+03	1.920E+01	4.708E+01	8.201E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.460E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	8.853E-06	0.0018	1.394E-07	0.0000	1.021E-06	0.0002	4.489E-10	0.0000	6.227E-10	0.0000	5.781E-07	0.0001
Pa-231	1.848E-09	0.0000	6.645E-11	0.0000	3.090E-09	0.0000	1.486E-10	0.0000	1.961E-13	0.0000	4.082E-10	0.0000
Pb-210	2.076E-06	0.0004	7.162E-07	0.0001	1.705E-03	0.3389	1.324E-05	0.0026	6.437E-06	0.0013	1.040E-04	0.0207
Ra-226	2.416E-03	0.4801	3.681E-07	0.0001	6.128E-04	0.1218	4.040E-06	0.0008	4.947E-06	0.0010	1.731E-05	0.0034
Th-230	3.380E-07	0.0001	1.278E-06	0.0003	5.008E-06	0.0010	2.328E-08	0.0000	1.661E-09	0.0000	6.769E-06	0.0013
U-234	3.118E-07	0.0001	1.520E-06	0.0003	2.987E-05	0.0059	2.229E-07	0.0000	5.464E-07	0.0001	1.575E-05	0.0031
U-235	2.280E-05	0.0045	4.640E-08	0.0000	1.051E-06	0.0002	7.846E-09	0.0000	1.924E-08	0.0000	5.597E-07	0.0001
U-238	3.347E-05	0.0067	3.057E-07	0.0001	9.276E-06	0.0018	6.921E-08	0.0000	1.697E-07	0.0000	5.131E-06	0.0010
Total	2.484E-03	0.4936	4.374E-06	0.0009	2.364E-03	0.4698	1.760E-05	0.0035	1.212E-05	0.0024	1.501E-04	0.0298

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.059E-05	0.0021
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.561E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.832E-03	0.3640
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.055E-03	0.6072
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.342E-05	0.0027
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.822E-05	0.0096
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.448E-05	0.0049
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.842E-05	0.0096
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.032E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	8.848E-06	0.0018	1.393E-07	0.0000	0.000E+00	0.0000	1.021E-06	0.0002	4.479E-10	0.0000	6.224E-10	0.0000	5.778E-07	0.0001
Pb-210	1.641E-06	0.0003	5.661E-07	0.0001	0.000E+00	0.0000	1.346E-03	0.2674	1.040E-05	0.0021	5.069E-06	0.0010	8.219E-05	0.0163
Ra-226	2.394E-03	0.4758	5.138E-07	0.0001	0.000E+00	0.0000	9.646E-04	0.1917	6.820E-06	0.0014	6.260E-06	0.0012	3.879E-05	0.0077
Th-230	2.242E-05	0.0045	1.282E-06	0.0003	0.000E+00	0.0000	1.296E-05	0.0026	7.868E-08	0.0000	5.563E-08	0.0000	7.068E-06	0.0014
U-234	3.179E-07	0.0001	1.521E-06	0.0003	0.000E+00	0.0000	2.987E-05	0.0059	2.229E-07	0.0000	5.464E-07	0.0001	1.575E-05	0.0031
U-235	2.281E-05	0.0045	4.655E-08	0.0000	0.000E+00	0.0000	1.055E-06	0.0002	7.996E-09	0.0000	1.924E-08	0.0000	5.604E-07	0.0001
U-238	3.347E-05	0.0067	3.057E-07	0.0001	0.000E+00	0.0000	9.276E-06	0.0018	6.922E-08	0.0000	1.697E-07	0.0000	5.131E-06	0.0010
Total	2.484E-03	0.4936	4.374E-06	0.0009	0.000E+00	0.0000	2.364E-03	0.4698	1.760E-05	0.0035	1.212E-05	0.0024	1.501E-04	0.0298

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.059E-05	0.0021
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.445E-03	0.2872
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.411E-03	0.6779
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.387E-05	0.0087
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.823E-05	0.0096
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.449E-05	0.0049
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.842E-05	0.0096
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.032E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					
Radio- Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	3.344E-02	7.840E+01	3.441E-02	4.781E-02	2.499E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.035E+02
Pa-231	3.262E-06	2.977E-02	1.322E-03	2.205E-06	2.438E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.354E-02
Pb-210	2.112E+00	1.984E+04	1.539E+02	7.486E+01	1.579E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.165E+04
Ra-226	1.055E+00	3.957E+04	2.609E+02	3.194E+02	7.886E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.094E+04
Th-230	1.495E+00	1.403E+03	6.522E+00	4.653E-01	1.117E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.527E+03
U-234	4.475E+00	1.049E+04	7.830E+01	1.920E+02	3.344E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.411E+04
U-235	1.542E-01	3.615E+02	2.697E+00	6.613E+00	1.152E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.860E+02
U-238	1.097E+00	2.572E+03	1.919E+01	4.706E+01	8.198E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.458E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	8.576E-06	0.0017	1.350E-07	0.0000	9.891E-07	0.0002	4.350E-10	0.0000	6.032E-10	0.0000	5.600E-07	0.0001
Pa-231	1.971E-09	0.0000	7.086E-11	0.0000	3.295E-09	0.0000	1.584E-10	0.0000	2.091E-13	0.0000	4.353E-10	0.0000
Pb-210	2.050E-06	0.0004	7.072E-07	0.0001	1.684E-03	0.3362	1.308E-05	0.0026	6.359E-06	0.0013	1.027E-04	0.0205
Ra-226	2.416E-03	0.4823	3.681E-07	0.0001	6.129E-04	0.1223	4.040E-06	0.0008	4.947E-06	0.0010	1.731E-05	0.0035
Th-230	3.380E-07	0.0001	1.278E-06	0.0003	5.008E-06	0.0010	2.328E-08	0.0000	1.661E-09	0.0000	6.769E-06	0.0014
U-234	3.117E-07	0.0001	1.520E-06	0.0003	2.985E-05	0.0060	2.227E-07	0.0000	5.461E-07	0.0001	1.574E-05	0.0031
U-235	2.279E-05	0.0045	4.638E-08	0.0000	1.051E-06	0.0002	7.842E-09	0.0000	1.923E-08	0.0000	5.594E-07	0.0001
U-238	3.345E-05	0.0067	3.055E-07	0.0001	9.271E-06	0.0019	6.918E-08	0.0000	1.696E-07	0.0000	5.128E-06	0.0010
Total	2.484E-03	0.4958	4.360E-06	0.0009	2.344E-03	0.4678	1.745E-05	0.0035	1.204E-05	0.0024	1.487E-04	0.0297

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.026E-05	0.0020
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.930E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.809E-03	0.3611
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.056E-03	0.6100
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.342E-05	0.0027
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.819E-05	0.0096
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.447E-05	0.0049
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.840E-05	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.010E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	8.570E-06	0.0017	1.349E-07	0.0000	0.000E+00	0.0000	9.885E-07	0.0002	4.339E-10	0.0000	6.028E-10	0.0000	5.597E-07	0.0001
Pb-210	1.590E-06	0.0003	5.486E-07	0.0001	0.000E+00	0.0000	1.304E-03	0.2603	1.008E-05	0.0020	4.913E-06	0.0010	7.965E-05	0.0159
Ra-226	2.393E-03	0.4777	5.221E-07	0.0001	0.000E+00	0.0000	9.847E-04	0.1966	6.980E-06	0.0014	6.335E-06	0.0013	4.001E-05	0.0080
Th-230	2.389E-05	0.0048	1.282E-06	0.0003	0.000E+00	0.0000	1.356E-05	0.0027	8.288E-08	0.0000	5.947E-08	0.0000	7.092E-06	0.0014
U-234	3.184E-07	0.0001	1.520E-06	0.0003	0.000E+00	0.0000	2.986E-05	0.0060	2.228E-07	0.0000	5.461E-07	0.0001	1.574E-05	0.0031
U-235	2.280E-05	0.0045	4.654E-08	0.0000	0.000E+00	0.0000	1.055E-06	0.0002	8.002E-09	0.0000	1.923E-08	0.0000	5.602E-07	0.0001
U-238	3.345E-05	0.0067	3.055E-07	0.0001	0.000E+00	0.0000	9.272E-06	0.0019	6.918E-08	0.0000	1.696E-07	0.0000	5.129E-06	0.0010
Total	2.484E-03	0.4958	4.360E-06	0.0009	0.000E+00	0.0000	2.344E-03	0.4678	1.745E-05	0.0035	1.204E-05	0.0024	1.487E-04	0.0297

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.025E-05	0.0020
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.401E-03	0.2796
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.432E-03	0.6850
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.597E-05	0.0092
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.821E-05	0.0096
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.448E-05	0.0049
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.840E-05	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.010E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	3.137E-02	7.356E+01	3.229E-02	4.486E-02	2.344E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.708E+01
Pa-231	9.781E-06	9.090E-02	4.275E-03	6.043E-06	7.310E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E-01
Pb-210	2.047E+00	1.923E+04	1.492E+02	7.257E+01	1.530E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.098E+04
Ra-226	1.056E+00	3.959E+04	2.610E+02	3.195E+02	7.889E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.096E+04
Th-230	1.495E+00	1.403E+03	6.522E+00	4.653E-01	1.117E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.527E+03
U-234	4.471E+00	1.048E+04	7.822E+01	1.918E+02	3.341E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.409E+04
U-235	1.540E-01	3.611E+02	2.695E+00	6.607E+00	1.151E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.855E+02
U-238	1.096E+00	2.570E+03	1.917E+01	4.701E+01	8.190E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.455E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	8.047E-06	0.0016	1.267E-07	0.0000	9.282E-07	0.0002	4.083E-10	0.0000	5.660E-10	0.0000	5.255E-07	0.0001
Pa-231	2.216E-09	0.0000	7.969E-11	0.0000	3.706E-09	0.0000	1.783E-10	0.0000	2.349E-13	0.0000	4.895E-10	0.0000
Pb-210	2.000E-06	0.0004	6.902E-07	0.0001	1.644E-03	0.3310	1.277E-05	0.0026	6.206E-06	0.0012	1.002E-04	0.0202
Ra-226	2.417E-03	0.4867	3.682E-07	0.0001	6.131E-04	0.1234	4.042E-06	0.0008	4.949E-06	0.0010	1.732E-05	0.0035
Th-230	3.380E-07	0.0001	1.278E-06	0.0003	5.008E-06	0.0010	2.328E-08	0.0000	1.661E-09	0.0000	6.769E-06	0.0014
U-234	3.114E-07	0.0001	1.518E-06	0.0003	2.982E-05	0.0060	2.225E-07	0.0000	5.456E-07	0.0001	1.573E-05	0.0032
U-235	2.277E-05	0.0046	4.634E-08	0.0000	1.050E-06	0.0002	7.835E-09	0.0000	1.921E-08	0.0000	5.589E-07	0.0001
U-238	3.342E-05	0.0067	3.052E-07	0.0001	9.263E-06	0.0019	6.912E-08	0.0000	1.695E-07	0.0000	5.124E-06	0.0010
Total	2.484E-03	0.5001	4.333E-06	0.0009	2.303E-03	0.4637	1.713E-05	0.0034	1.189E-05	0.0024	1.462E-04	0.0294

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.628E-06	0.0019
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.670E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.766E-03	0.3555
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.057E-03	0.6155
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.342E-05	0.0027
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.815E-05	0.0097
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.445E-05	0.0049
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.835E-05	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.967E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	8.040E-06	0.0016	1.266E-07	0.0000	0.000E+00	0.0000	9.274E-07	0.0002	4.071E-10	0.0000	5.656E-10	0.0000	5.251E-07	0.0001
Pb-210	1.493E-06	0.0003	5.153E-07	0.0001	0.000E+00	0.0000	1.225E-03	0.2466	9.469E-06	0.0019	4.614E-06	0.0009	7.480E-05	0.0151
Ra-226	2.391E-03	0.4814	5.378E-07	0.0001	0.000E+00	0.0000	1.022E-03	0.2059	7.272E-06	0.0015	6.475E-06	0.0013	4.234E-05	0.0085
Th-230	2.683E-05	0.0054	1.283E-06	0.0003	0.000E+00	0.0000	1.479E-05	0.0030	9.162E-08	0.0000	6.733E-08	0.0000	7.142E-06	0.0014
U-234	3.195E-07	0.0001	1.519E-06	0.0003	0.000E+00	0.0000	2.983E-05	0.0060	2.226E-07	0.0000	5.456E-07	0.0001	1.573E-05	0.0032
U-235	2.278E-05	0.0046	4.652E-08	0.0000	0.000E+00	0.0000	1.054E-06	0.0002	8.015E-09	0.0000	1.921E-08	0.0000	5.598E-07	0.0001
U-238	3.342E-05	0.0067	3.053E-07	0.0001	0.000E+00	0.0000	9.263E-06	0.0019	6.912E-08	0.0000	1.695E-07	0.0000	5.124E-06	0.0010
Total	2.484E-03	0.5001	4.333E-06	0.0009	0.000E+00	0.0000	2.303E-03	0.4637	1.713E-05	0.0034	1.189E-05	0.0024	1.462E-04	0.0294

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.621E-06	0.0019
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.316E-03	0.2649
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.470E-03	0.6987
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.020E-05	0.0101
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.816E-05	0.0097
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.446E-05	0.0049
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.835E-05	0.0097
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.967E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	2.510E-02	5.884E+01	2.585E-02	3.589E-02	1.875E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.766E+01
Pa-231	3.254E-05	3.043E-01	1.459E-02	1.944E-05	2.432E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.432E-01
Pb-210	1.850E+00	1.738E+04	1.349E+02	6.560E+01	1.383E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.896E+04
Ra-226	1.057E+00	3.963E+04	2.612E+02	3.199E+02	7.898E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.100E+04
Th-230	1.495E+00	1.403E+03	6.521E+00	4.652E-01	1.117E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.527E+03
U-234	4.456E+00	1.045E+04	7.797E+01	1.912E+02	3.330E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.405E+04
U-235	1.535E-01	3.599E+02	2.686E+00	6.585E+00	1.147E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.839E+02
U-238	1.092E+00	2.561E+03	1.911E+01	4.686E+01	8.163E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.444E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	6.442E-06	0.0013	1.014E-07	0.0000	7.430E-07	0.0002	3.274E-10	0.0000	4.531E-10	0.0000	4.207E-07	0.0001
Pa-231	3.073E-09	0.0000	1.105E-10	0.0000	5.141E-09	0.0000	2.476E-10	0.0000	3.250E-13	0.0000	6.788E-10	0.0000
Pb-210	1.850E-06	0.0004	6.383E-07	0.0001	1.520E-03	0.3145	1.181E-05	0.0024	5.741E-06	0.0012	9.266E-05	0.0192
Ra-226	2.420E-03	0.5005	3.687E-07	0.0001	6.138E-04	0.1269	4.046E-06	0.0008	4.954E-06	0.0010	1.734E-05	0.0036
Th-230	3.380E-07	0.0001	1.278E-06	0.0003	5.007E-06	0.0010	2.328E-08	0.0000	1.661E-09	0.0000	6.769E-06	0.0014
U-234	3.104E-07	0.0001	1.513E-06	0.0003	2.973E-05	0.0061	2.218E-07	0.0000	5.438E-07	0.0001	1.567E-05	0.0032
U-235	2.269E-05	0.0047	4.619E-08	0.0000	1.047E-06	0.0002	7.809E-09	0.0000	1.915E-08	0.0000	5.571E-07	0.0001
U-238	3.331E-05	0.0069	3.043E-07	0.0001	9.232E-06	0.0019	6.889E-08	0.0000	1.689E-07	0.0000	5.107E-06	0.0011
Total	2.485E-03	0.5139	4.250E-06	0.0009	2.180E-03	0.4509	1.618E-05	0.0033	1.143E-05	0.0024	1.385E-04	0.0286

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.708E-06	0.0016
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.251E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.633E-03	0.3378
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.060E-03	0.6329
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.342E-05	0.0028
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.799E-05	0.0099
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.437E-05	0.0050
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.819E-05	0.0100
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.835E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	6.431E-06	0.0013	1.013E-07	0.0000	0.000E+00	0.0000	7.418E-07	0.0002	3.256E-10	0.0000	4.524E-10	0.0000	4.200E-07	0.0001
Pb-210	1.199E-06	0.0002	4.136E-07	0.0001	0.000E+00	0.0000	9.832E-04	0.2033	7.602E-06	0.0016	3.704E-06	0.0008	6.005E-05	0.0124
Ra-226	2.384E-03	0.4930	5.855E-07	0.0001	0.000E+00	0.0000	1.137E-03	0.2351	8.157E-06	0.0017	6.897E-06	0.0014	4.937E-05	0.0102
Th-230	3.708E-05	0.0077	1.285E-06	0.0003	0.000E+00	0.0000	1.943E-05	0.0040	1.248E-07	0.0000	9.607E-08	0.0000	7.337E-06	0.0015
U-234	3.244E-07	0.0001	1.514E-06	0.0003	0.000E+00	0.0000	2.973E-05	0.0061	2.219E-07	0.0000	5.439E-07	0.0001	1.568E-05	0.0032
U-235	2.271E-05	0.0047	4.647E-08	0.0000	0.000E+00	0.0000	1.053E-06	0.0002	8.059E-09	0.0000	1.915E-08	0.0000	5.585E-07	0.0001
U-238	3.331E-05	0.0069	3.043E-07	0.0001	0.000E+00	0.0000	9.233E-06	0.0019	6.890E-08	0.0000	1.689E-07	0.0000	5.107E-06	0.0011
Total	2.485E-03	0.5139	4.250E-06	0.0009	0.000E+00	0.0000	2.180E-03	0.4509	1.618E-05	0.0033	1.143E-05	0.0024	1.385E-04	0.0286

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.695E-06	0.0016
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.056E-03	0.2184
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.585E-03	0.7415
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.535E-05	0.0135
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.802E-05	0.0099
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.439E-05	0.0050
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.820E-05	0.0100
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.835E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.329E-02	3.116E+01	1.375E-02	1.900E-02	9.933E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.113E+01
Pa-231	9.709E-05	9.096E-01	4.384E-02	5.744E-05	7.256E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.026E+00
Pb-210	1.476E+00	1.388E+04	1.079E+02	5.240E+01	1.103E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.514E+04
Ra-226	1.060E+00	3.976E+04	2.621E+02	3.209E+02	7.923E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.113E+04
Th-230	1.494E+00	1.403E+03	6.520E+00	4.651E-01	1.117E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.526E+03
U-234	4.414E+00	1.035E+04	7.724E+01	1.894E+02	3.299E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.392E+04
U-235	1.521E-01	3.566E+02	2.661E+00	6.524E+00	1.137E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.794E+02
U-238	1.082E+00	2.537E+03	1.893E+01	4.642E+01	8.087E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.412E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.425E-06	0.0007	5.393E-08	0.0000	3.951E-07	0.0001	1.756E-10	0.0000	2.409E-10	0.0000	2.237E-07	0.0000
Pa-231	5.503E-09	0.0000	1.979E-10	0.0000	9.211E-09	0.0000	4.443E-10	0.0000	5.806E-13	0.0000	1.216E-09	0.0000
Pb-210	1.566E-06	0.0003	5.402E-07	0.0001	1.287E-03	0.2805	1.001E-05	0.0022	4.863E-06	0.0011	7.843E-05	0.0171
Ra-226	2.428E-03	0.5289	3.698E-07	0.0001	6.157E-04	0.1342	4.059E-06	0.0009	4.970E-06	0.0011	1.739E-05	0.0038
Th-230	3.379E-07	0.0001	1.278E-06	0.0003	5.006E-06	0.0011	2.327E-08	0.0000	1.660E-09	0.0000	6.767E-06	0.0015
U-234	3.075E-07	0.0001	1.499E-06	0.0003	2.945E-05	0.0064	2.197E-07	0.0000	5.388E-07	0.0001	1.553E-05	0.0034
U-235	2.248E-05	0.0049	4.576E-08	0.0000	1.037E-06	0.0002	7.737E-09	0.0000	1.897E-08	0.0000	5.519E-07	0.0001
U-238	3.300E-05	0.0072	3.014E-07	0.0001	9.147E-06	0.0020	6.825E-08	0.0000	1.673E-07	0.0000	5.060E-06	0.0011
Total	2.489E-03	0.5422	4.088E-06	0.0009	1.948E-03	0.4245	1.439E-05	0.0031	1.056E-05	0.0023	1.240E-04	0.0270

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

	Water		Fish		Plant		Meat		Milk		All Pathways**	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.098E-06	0.0009
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.657E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.383E-03	0.3013
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.070E-03	0.6689
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.341E-05	0.0029
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.754E-05	0.0104
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.414E-05	0.0053
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.775E-05	0.0104
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.590E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.398E-06	0.0007	5.349E-08	0.0000	0.000E+00	0.0000	3.919E-07	0.0001	1.720E-10	0.0000	2.390E-10	0.0000	2.219E-07	0.0000
Pb-210	6.400E-07	0.0001	2.208E-07	0.0000	0.000E+00	0.0000	5.249E-04	0.1144	4.058E-06	0.0009	1.977E-06	0.0004	3.206E-05	0.0070
Ra-226	2.363E-03	0.5147	6.737E-07	0.0001	0.000E+00	0.0000	1.348E-03	0.2938	9.800E-06	0.0021	7.672E-06	0.0017	6.249E-05	0.0136
Th-230	6.617E-05	0.0144	1.292E-06	0.0003	0.000E+00	0.0000	3.481E-05	0.0076	2.360E-07	0.0001	1.859E-07	0.0000	8.027E-06	0.0017
U-234	3.491E-07	0.0001	1.501E-06	0.0003	0.000E+00	0.0000	2.947E-05	0.0064	2.199E-07	0.0000	5.389E-07	0.0001	1.554E-05	0.0034
U-235	2.251E-05	0.0049	4.639E-08	0.0000	0.000E+00	0.0000	1.049E-06	0.0002	8.185E-09	0.0000	1.897E-08	0.0000	5.549E-07	0.0001
U-238	3.300E-05	0.0072	3.015E-07	0.0001	0.000E+00	0.0000	9.148E-06	0.0020	6.826E-08	0.0000	1.674E-07	0.0000	5.060E-06	0.0011
Total	2.489E-03	0.5422	4.088E-06	0.0009	0.000E+00	0.0000	1.948E-03	0.4245	1.439E-05	0.0031	1.056E-05	0.0023	1.240E-04	0.0270

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.065E-06	0.0009
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.639E-04	0.1228
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.792E-03	0.8261
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.107E-04	0.0241
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.762E-05	0.0104
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.419E-05	0.0053
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.775E-05	0.0104
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.590E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.644E-03	3.856E+00	1.942E-03	2.351E-03	1.228E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.089E+00
Pa-231	3.175E-04	2.976E+00	1.437E-01	1.872E-04	2.373E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.358E+00
Pb-210	1.104E+00	1.039E+04	8.090E+01	3.927E+01	8.254E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.133E+04
Ra-226	1.072E+00	4.020E+04	2.650E+02	3.245E+02	8.010E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.159E+04
Th-230	1.493E+00	1.401E+03	6.515E+00	4.648E-01	1.116E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.524E+03
U-234	4.272E+00	1.002E+04	7.475E+01	1.833E+02	3.193E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.347E+04
U-235	1.472E-01	3.451E+02	2.575E+00	6.314E+00	1.100E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.640E+02
U-238	1.047E+00	2.456E+03	1.833E+01	4.493E+01	7.827E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.302E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.709E-07	0.0001	7.414E-09	0.0000	5.437E-08	0.0000	2.947E-11	0.0000	3.315E-11	0.0000	3.075E-08	0.0000
Pa-231	1.380E-08	0.0000	4.963E-10	0.0000	2.311E-08	0.0000	1.116E-09	0.0000	1.453E-12	0.0000	3.049E-09	0.0000
Pb-210	1.286E-06	0.0003	4.437E-07	0.0001	1.058E-03	0.2422	8.241E-06	0.0019	4.000E-06	0.0009	6.442E-05	0.0147
Ra-226	2.454E-03	0.5616	3.738E-07	0.0001	6.224E-04	0.1424	4.103E-06	0.0009	5.024E-06	0.0011	1.758E-05	0.0040
Th-230	3.377E-07	0.0001	1.277E-06	0.0003	5.002E-06	0.0011	2.325E-08	0.0000	1.659E-09	0.0000	6.762E-06	0.0015
U-234	2.976E-07	0.0001	1.451E-06	0.0003	2.850E-05	0.0065	2.126E-07	0.0000	5.214E-07	0.0001	1.503E-05	0.0034
U-235	2.176E-05	0.0050	4.429E-08	0.0000	1.004E-06	0.0002	7.488E-09	0.0000	1.836E-08	0.0000	5.342E-07	0.0001
U-238	3.194E-05	0.0073	2.917E-07	0.0001	8.853E-06	0.0020	6.606E-08	0.0000	1.620E-07	0.0000	4.897E-06	0.0011
Total	2.510E-03	0.5744	3.889E-06	0.0009	1.724E-03	0.3946	1.265E-05	0.0029	9.727E-06	0.0022	1.093E-04	0.0250

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.635E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.157E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.137E-03	0.2601
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.103E-03	0.7102
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.340E-05	0.0031
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.601E-05	0.0105
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.337E-05	0.0053
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.621E-05	0.0106
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.370E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.642E-07	0.0001	5.734E-09	0.0000	0.000E+00	0.0000	4.200E-08	0.0000	1.844E-11	0.0000	2.562E-11	0.0000	2.378E-08	0.0000
Pb-210	7.115E-08	0.0000	2.455E-08	0.0000	0.000E+00	0.0000	5.836E-05	0.0134	4.512E-07	0.0001	2.199E-07	0.0001	3.564E-06	0.0008
Ra-226	2.289E-03	0.5239	7.463E-07	0.0002	0.000E+00	0.0000	1.529E-03	0.3499	1.122E-05	0.0026	8.271E-06	0.0019	7.413E-05	0.0170
Th-230	1.658E-04	0.0379	1.319E-06	0.0003	0.000E+00	0.0000	9.814E-05	0.0225	6.993E-07	0.0002	5.338E-07	0.0001	1.104E-05	0.0025
U-234	5.542E-07	0.0001	1.455E-06	0.0003	0.000E+00	0.0000	2.864E-05	0.0066	2.136E-07	0.0000	5.221E-07	0.0001	1.505E-05	0.0034
U-235	2.188E-05	0.0050	4.647E-08	0.0000	0.000E+00	0.0000	1.039E-06	0.0002	8.615E-09	0.0000	1.837E-08	0.0000	5.442E-07	0.0001
U-238	3.194E-05	0.0073	2.919E-07	0.0001	0.000E+00	0.0000	8.855E-06	0.0020	6.608E-08	0.0000	1.620E-07	0.0000	4.898E-06	0.0011
Total	2.510E-03	0.5744	3.889E-06	0.0009	0.000E+00	0.0000	1.724E-03	0.3946	1.265E-05	0.0029	9.727E-06	0.0022	1.093E-04	0.0250

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.357E-07	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.269E-05	0.0143
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.913E-03	0.8954
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.775E-04	0.0635
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.644E-05	0.0106
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.354E-05	0.0054
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.622E-05	0.0106
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.370E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	8.147E-04	1.917E+00	1.551E-03	1.168E-03	6.088E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.529E+00
Pa-231	9.022E-04	8.458E+00	4.086E-01	5.314E-04	6.742E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.542E+00
Pb-210	1.088E+00	1.023E+04	7.972E+01	3.869E+01	8.130E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.117E+04
Ra-226	1.103E+00	4.136E+04	2.727E+02	3.339E+02	8.243E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.279E+04
Th-230	1.490E+00	1.398E+03	6.499E+00	4.636E-01	1.113E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.518E+03
U-234	3.890E+00	9.121E+03	6.806E+01	1.669E+02	2.907E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.226E+04
U-235	1.341E-01	3.144E+02	2.346E+00	5.752E+00	1.002E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.227E+02
U-238	9.540E-01	2.237E+03	1.669E+01	4.093E+01	7.130E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.008E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.408E-07	0.0001	5.365E-09	0.0000	3.945E-08	0.0000	3.185E-11	0.0000	2.404E-11	0.0000	2.225E-08	0.0000
Pa-231	3.581E-08	0.0000	1.288E-09	0.0000	5.997E-08	0.0000	2.897E-09	0.0000	3.767E-12	0.0000	7.910E-09	0.0000
Pb-210	1.286E-06	0.0003	4.437E-07	0.0001	1.058E-03	0.2379	8.243E-06	0.0019	4.000E-06	0.0009	6.442E-05	0.0145
Ra-226	2.524E-03	0.5675	3.846E-07	0.0001	6.403E-04	0.1439	4.221E-06	0.0009	5.169E-06	0.0012	1.809E-05	0.0041
Th-230	3.368E-07	0.0001	1.273E-06	0.0003	4.990E-06	0.0011	2.320E-08	0.0000	1.655E-09	0.0000	6.745E-06	0.0015
U-234	2.709E-07	0.0001	1.321E-06	0.0003	2.595E-05	0.0058	1.936E-07	0.0000	4.747E-07	0.0001	1.368E-05	0.0031
U-235	1.982E-05	0.0045	4.034E-08	0.0000	9.141E-07	0.0002	6.821E-09	0.0000	1.672E-08	0.0000	4.866E-07	0.0001
U-238	2.910E-05	0.0065	2.657E-07	0.0001	8.064E-06	0.0018	6.017E-08	0.0000	1.475E-07	0.0000	4.461E-06	0.0010
Total	2.576E-03	0.5790	3.735E-06	0.0008	1.739E-03	0.3908	1.275E-05	0.0029	9.810E-06	0.0022	1.079E-04	0.0243

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.079E-07	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.079E-07	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.137E-03	0.2555
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.193E-03	0.7177
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.337E-05	0.0030
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.189E-05	0.0094
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.128E-05	0.0048
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.209E-05	0.0095
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.448E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.169E-10	0.0000	9.713E-12	0.0000	0.000E+00	0.0000	7.116E-11	0.0000	3.123E-14	0.0000	4.339E-14	0.0000	4.029E-11	0.0000
Pb-210	1.338E-10	0.0000	4.618E-11	0.0000	0.000E+00	0.0000	1.098E-07	0.0000	8.487E-10	0.0000	4.136E-10	0.0000	6.705E-09	0.0000
Ra-226	2.092E-03	0.4703	6.930E-07	0.0002	0.000E+00	0.0000	1.423E-03	0.3200	1.045E-05	0.0023	7.656E-06	0.0017	6.934E-05	0.0156
Th-230	4.323E-04	0.0972	1.398E-06	0.0003	0.000E+00	0.0000	2.790E-04	0.0627	2.027E-06	0.0005	1.508E-06	0.0003	1.980E-05	0.0045
U-234	2.066E-06	0.0005	1.331E-06	0.0003	0.000E+00	0.0000	2.706E-05	0.0061	2.016E-07	0.0000	4.806E-07	0.0001	1.378E-05	0.0031
U-235	2.020E-05	0.0045	4.699E-08	0.0000	0.000E+00	0.0000	1.013E-06	0.0002	9.750E-09	0.0000	1.675E-08	0.0000	5.167E-07	0.0001
U-238	2.910E-05	0.0065	2.660E-07	0.0001	0.000E+00	0.0000	8.070E-06	0.0018	6.021E-08	0.0000	1.476E-07	0.0000	4.464E-06	0.0010
Total	2.576E-03	0.5790	3.735E-06	0.0008	0.000E+00	0.0000	1.739E-03	0.3908	1.275E-05	0.0029	9.810E-06	0.0022	1.079E-04	0.0243

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.381E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E-07	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.603E-03	0.8100
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.361E-04	0.1655
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.492E-05	0.0101
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.180E-05	0.0049
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.210E-05	0.0095
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.448E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.432E-03	5.722E+00	4.476E-03	3.486E-03	1.818E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.548E+00
Pa-231	2.496E-03	2.340E+01	1.131E+00	1.470E-03	1.865E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.640E+01
Pb-210	1.175E+00	1.105E+04	8.609E+01	4.178E+01	8.780E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.206E+04
Ra-226	1.189E+00	4.460E+04	2.940E+02	3.600E+02	8.888E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.614E+04
Th-230	1.472E+00	1.381E+03	6.422E+00	4.581E-01	1.100E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.488E+03
U-234	2.802E+00	6.569E+03	4.902E+01	1.202E+02	2.094E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.832E+03
U-235	9.671E-02	2.268E+02	1.692E+00	4.149E+00	7.228E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.049E+02
U-238	6.882E-01	1.614E+03	1.204E+01	2.952E+01	5.143E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.170E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.796E-07	0.0002	1.542E-08	0.0000	1.134E-07	0.0000	8.867E-11	0.0000	6.908E-11	0.0000	6.398E-08	0.0000
Pa-231	9.579E-08	0.0000	3.445E-09	0.0000	1.604E-07	0.0000	7.751E-09	0.0000	1.007E-11	0.0000	2.116E-08	0.0000
Pb-210	1.388E-06	0.0003	4.789E-07	0.0001	1.142E-03	0.2401	8.896E-06	0.0019	4.317E-06	0.0009	6.952E-05	0.0146
Ra-226	2.720E-03	0.5718	4.144E-07	0.0001	6.900E-04	0.1450	4.548E-06	0.0010	5.569E-06	0.0012	1.949E-05	0.0041
Th-230	3.328E-07	0.0001	1.258E-06	0.0003	4.930E-06	0.0010	2.292E-08	0.0000	1.635E-09	0.0000	6.664E-06	0.0014
U-234	1.951E-07	0.0000	9.514E-07	0.0002	1.869E-05	0.0039	1.395E-07	0.0000	3.419E-07	0.0001	9.855E-06	0.0021
U-235	1.430E-05	0.0030	2.910E-08	0.0000	6.594E-07	0.0001	4.920E-09	0.0000	1.206E-08	0.0000	3.510E-07	0.0001
U-238	2.099E-05	0.0044	1.917E-07	0.0000	5.817E-06	0.0012	4.340E-08	0.0000	1.064E-07	0.0000	3.218E-06	0.0007
Total	2.758E-03	0.5798	3.342E-06	0.0007	1.862E-03	0.3915	1.366E-05	0.0029	1.035E-05	0.0022	1.092E-04	0.0229

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.173E-06	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.886E-07	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.227E-03	0.2578
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.440E-03	0.7231
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.321E-05	0.0028
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.017E-05	0.0063
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.535E-05	0.0032
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.036E-05	0.0064
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.757E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years
0 Water Independent Pathways (Inhalation excludes radon)
0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.234E-19	0.0000	1.943E-21	0.0000	0.000E+00	0.0000	1.424E-20	0.0000	6.249E-24	0.0000	8.683E-24	0.0000	8.061E-21	0.0000
Pb-210	3.863E-20	0.0000	1.333E-20	0.0000	0.000E+00	0.0000	3.168E-17	0.0000	2.450E-19	0.0000	1.194E-19	0.0000	1.935E-18	0.0000
Ra-226	1.525E-03	0.3206	5.053E-07	0.0001	0.000E+00	0.0000	1.038E-03	0.2182	7.621E-06	0.0016	5.583E-06	0.0012	5.057E-05	0.0106
Th-230	1.182E-03	0.2484	1.614E-06	0.0003	0.000E+00	0.0000	7.892E-04	0.1659	5.774E-06	0.0012	4.252E-06	0.0009	4.449E-05	0.0094
U-234	1.515E-05	0.0032	9.828E-07	0.0002	0.000E+00	0.0000	2.853E-05	0.0060	2.113E-07	0.0000	3.948E-07	0.0001	1.046E-05	0.0022
U-235	1.537E-05	0.0032	4.797E-08	0.0000	0.000E+00	0.0000	9.332E-07	0.0002	1.276E-08	0.0000	1.214E-08	0.0000	4.361E-07	0.0001
U-238	2.099E-05	0.0044	1.924E-07	0.0000	0.000E+00	0.0000	5.832E-06	0.0012	4.352E-08	0.0000	1.067E-07	0.0000	3.225E-06	0.0007
Total	2.758E-03	0.5798	3.342E-06	0.0007	0.000E+00	0.0000	1.862E-03	0.3915	1.366E-05	0.0029	1.035E-05	0.0022	1.092E-04	0.0229

0
Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.477E-19	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.404E-17	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.628E-03	0.5523
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.027E-03	0.4260
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.573E-05	0.0117
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.681E-05	0.0035
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.039E-05	0.0064
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.757E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0

Menu	Parameter	Current Value	Default	Parameter Name
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	3.734E-01	2.672E+03	9.133E+00	4.450E+00	1.278E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.813E+03
Ra-226	3.734E-01	1.069E+04	3.115E+01	3.814E+01	1.278E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.088E+04
Th-230	4.827E-01	3.456E+02	7.105E-01	5.069E-02	1.652E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.116E+02
U-234	1.921E-01	3.437E+02	1.134E+00	2.780E+00	6.573E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.134E+02
U-235	1.274E-02	2.280E+01	7.521E-02	1.844E-01	4.360E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.742E+01
U-238	8.086E-02	1.447E+02	4.773E-01	1.170E+00	2.767E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.740E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.499E-10	0.0000	6.415E-12	0.0000	3.634E-11	0.0000	2.777E-14	0.0000	9.764E-15	0.0000	1.218E-11	0.0000
Pa-231	1.683E-10	0.0000	5.474E-12	0.0000	1.942E-10	0.0000	4.130E-12	0.0000	5.450E-15	0.0000	1.540E-11	0.0000
Pb-210	4.807E-07	0.0003	1.513E-07	0.0001	2.753E-04	0.1962	9.474E-07	0.0007	4.599E-07	0.0003	1.006E-05	0.0072
Ra-226	9.367E-04	0.6676	1.301E-07	0.0001	1.654E-04	0.1178	4.819E-07	0.0003	5.901E-07	0.0004	2.802E-06	0.0020
Th-230	1.211E-07	0.0001	4.124E-07	0.0003	1.233E-06	0.0009	2.535E-09	0.0000	1.808E-10	0.0000	1.000E-06	0.0007
U-234	1.477E-08	0.0000	6.499E-08	0.0000	9.742E-07	0.0007	3.214E-09	0.0000	7.880E-09	0.0000	3.082E-07	0.0002
U-235	2.079E-06	0.0015	3.819E-09	0.0000	6.604E-08	0.0000	2.179E-10	0.0000	5.342E-10	0.0000	2.109E-08	0.0000
U-238	2.695E-06	0.0019	2.244E-08	0.0000	5.195E-07	0.0004	1.714E-09	0.0000	4.203E-09	0.0000	1.724E-07	0.0001
Total	9.421E-04	0.6714	7.851E-07	0.0006	4.434E-04	0.3160	1.437E-06	0.0010	1.063E-06	0.0008	1.436E-05	0.0102

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.049E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.876E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.874E-04	0.2048
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.106E-03	0.7883
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.769E-06	0.0020
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.373E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.171E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.416E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.403E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	3.123E-07	0.0002	9.829E-08	0.0001	0.000E+00	0.0000	1.783E-04	0.1271	6.095E-07	0.0004	2.970E-07	0.0002	6.533E-06	0.0047
Ra-226	9.291E-04	0.6621	1.817E-07	0.0001	0.000E+00	0.0000	2.604E-04	0.1856	8.138E-07	0.0006	7.472E-07	0.0005	6.281E-06	0.0045
Th-230	7.939E-06	0.0057	4.138E-07	0.0003	0.000E+00	0.0000	3.193E-06	0.0023	8.568E-09	0.0000	6.059E-09	0.0000	1.045E-06	0.0007
U-234	1.506E-08	0.0000	6.501E-08	0.0000	0.000E+00	0.0000	9.743E-07	0.0007	3.214E-09	0.0000	7.880E-09	0.0000	3.083E-07	0.0002
U-235	2.080E-06	0.0015	3.831E-09	0.0000	0.000E+00	0.0000	6.627E-08	0.0000	2.220E-10	0.0000	5.342E-10	0.0000	2.112E-08	0.0000
U-238	2.695E-06	0.0019	2.244E-08	0.0000	0.000E+00	0.0000	5.196E-07	0.0004	1.714E-09	0.0000	4.203E-09	0.0000	1.724E-07	0.0001
Total	9.421E-04	0.6714	7.851E-07	0.0006	0.000E+00	0.0000	4.434E-04	0.3160	1.437E-06	0.0010	1.063E-06	0.0008	1.436E-05	0.0102

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.861E-04	0.1327
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.197E-03	0.8534
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.260E-05	0.0090
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.374E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.171E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.416E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.403E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	4.245E-09	9.166E-06	6.562E-08	2.329E-09	1.452E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.069E-05
Pa-231	2.695E-07	1.877E-03	3.683E-05	6.147E-08	9.221E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.006E-03
Pb-210	3.732E-01	2.680E+03	9.227E+00	4.478E+00	1.277E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.821E+03
Ra-226	3.735E-01	1.069E+04	3.115E+01	3.814E+01	1.278E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.088E+04
Th-230	4.827E-01	3.456E+02	7.105E-01	5.069E-02	1.652E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.116E+02
U-234	1.920E-01	3.435E+02	1.133E+00	2.778E+00	6.569E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.131E+02
U-235	1.273E-02	2.278E+01	7.516E-02	1.843E-01	4.357E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.740E+01
U-238	8.080E-02	1.446E+02	4.770E-01	1.170E+00	2.765E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.739E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	4.929E-10	0.0000	7.028E-12	0.0000	3.979E-11	0.0000	2.982E-14	0.0000	1.069E-14	0.0000	1.335E-11	0.0000
Pa-231	1.795E-10	0.0000	5.837E-12	0.0000	2.071E-10	0.0000	4.403E-12	0.0000	5.812E-15	0.0000	1.642E-11	0.0000
Pb-210	4.806E-07	0.0003	1.513E-07	0.0001	2.753E-04	0.1962	9.480E-07	0.0007	4.601E-07	0.0003	1.005E-05	0.0072
Ra-226	9.368E-04	0.6676	1.302E-07	0.0001	1.654E-04	0.1178	4.820E-07	0.0003	5.902E-07	0.0004	2.803E-06	0.0020
Th-230	1.211E-07	0.0001	4.124E-07	0.0003	1.233E-06	0.0009	2.535E-09	0.0000	1.808E-10	0.0000	1.000E-06	0.0007
U-234	1.476E-08	0.0000	6.494E-08	0.0000	9.735E-07	0.0007	3.212E-09	0.0000	7.875E-09	0.0000	3.080E-07	0.0002
U-235	2.077E-06	0.0015	3.816E-09	0.0000	6.599E-08	0.0000	2.177E-10	0.0000	5.338E-10	0.0000	2.108E-08	0.0000
U-238	2.693E-06	0.0019	2.242E-08	0.0000	5.192E-07	0.0004	1.713E-09	0.0000	4.200E-09	0.0000	1.723E-07	0.0001
Total	9.422E-04	0.6714	7.850E-07	0.0006	4.434E-04	0.3160	1.438E-06	0.0010	1.063E-06	0.0008	1.436E-05	0.0102

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.531E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.133E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.874E-04	0.2048
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.106E-03	0.7883
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.769E-06	0.0020
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.169E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.413E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.403E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	3.026E-07	0.0002	9.524E-08	0.0001	0.000E+00	0.0000	1.728E-04	0.1231	5.905E-07	0.0004	2.878E-07	0.0002	6.331E-06	0.0045
Ra-226	9.287E-04	0.6618	1.847E-07	0.0001	0.000E+00	0.0000	2.658E-04	0.1894	8.329E-07	0.0006	7.562E-07	0.0005	6.478E-06	0.0046
Th-230	8.459E-06	0.0060	4.139E-07	0.0003	0.000E+00	0.0000	3.340E-06	0.0024	9.025E-09	0.0000	6.476E-09	0.0000	1.048E-06	0.0007
U-234	1.508E-08	0.0000	6.497E-08	0.0000	0.000E+00	0.0000	9.736E-07	0.0007	3.212E-09	0.0000	7.875E-09	0.0000	3.081E-07	0.0002
U-235	2.078E-06	0.0015	3.829E-09	0.0000	0.000E+00	0.0000	6.624E-08	0.0000	2.221E-10	0.0000	5.338E-10	0.0000	2.111E-08	0.0000
U-238	2.693E-06	0.0019	2.242E-08	0.0000	0.000E+00	0.0000	5.192E-07	0.0004	1.713E-09	0.0000	4.200E-09	0.0000	1.723E-07	0.0001
Total	9.422E-04	0.6714	7.850E-07	0.0006	0.000E+00	0.0000	4.434E-04	0.3160	1.438E-06	0.0010	1.063E-06	0.0008	1.436E-05	0.0102

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.804E-04	0.1285
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.203E-03	0.8571
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.328E-05	0.0095
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.373E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.170E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.413E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.403E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	3.738E-08	7.172E-05	2.207E-07	1.896E-08	1.279E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.475E-05
Pa-231	8.077E-07	5.728E-03	1.191E-04	1.684E-07	2.764E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.124E-03
Pb-210	3.729E-01	2.677E+03	9.220E+00	4.474E+00	1.276E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.819E+03
Ra-226	3.735E-01	1.069E+04	3.116E+01	3.815E+01	1.278E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.089E+04
Th-230	4.826E-01	3.456E+02	7.104E-01	5.068E-02	1.651E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.115E+02
U-234	1.917E-01	3.430E+02	1.132E+00	2.774E+00	6.559E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.125E+02
U-235	1.271E-02	2.275E+01	7.506E-02	1.840E-01	4.350E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.736E+01
U-238	8.068E-02	1.444E+02	4.763E-01	1.168E+00	2.761E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.736E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.856E-10	0.0000	8.350E-12	0.0000	4.725E-11	0.0000	3.403E-14	0.0000	1.270E-14	0.0000	1.586E-11	0.0000
Pa-231	2.018E-10	0.0000	6.563E-12	0.0000	2.329E-10	0.0000	4.954E-12	0.0000	6.528E-15	0.0000	1.846E-11	0.0000
Pb-210	4.803E-07	0.0003	1.512E-07	0.0001	2.751E-04	0.1961	9.475E-07	0.0007	4.598E-07	0.0003	1.005E-05	0.0072
Ra-226	9.370E-04	0.6677	1.302E-07	0.0001	1.654E-04	0.1179	4.821E-07	0.0003	5.903E-07	0.0004	2.803E-06	0.0020
Th-230	1.211E-07	0.0001	4.123E-07	0.0003	1.233E-06	0.0009	2.534E-09	0.0000	1.808E-10	0.0000	1.000E-06	0.0007
U-234	1.474E-08	0.0000	6.485E-08	0.0000	9.721E-07	0.0007	3.207E-09	0.0000	7.863E-09	0.0000	3.076E-07	0.0002
U-235	2.074E-06	0.0015	3.811E-09	0.0000	6.589E-08	0.0000	2.174E-10	0.0000	5.330E-10	0.0000	2.105E-08	0.0000
U-238	2.689E-06	0.0019	2.239E-08	0.0000	5.184E-07	0.0004	1.710E-09	0.0000	4.194E-09	0.0000	1.721E-07	0.0001
Total	9.424E-04	0.6715	7.848E-07	0.0006	4.433E-04	0.3159	1.437E-06	0.0010	1.063E-06	0.0008	1.435E-05	0.0102

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.571E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.647E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.872E-04	0.2047
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.106E-03	0.7884
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.769E-06	0.0020
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.370E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.166E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.408E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.403E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	2.841E-07	0.0002	8.941E-08	0.0001	0.000E+00	0.0000	1.622E-04	0.1156	5.544E-07	0.0004	2.702E-07	0.0002	5.944E-06	0.0042
Ra-226	9.278E-04	0.6612	1.902E-07	0.0001	0.000E+00	0.0000	2.759E-04	0.1966	8.677E-07	0.0006	7.728E-07	0.0006	6.853E-06	0.0049
Th-230	9.497E-06	0.0068	4.140E-07	0.0003	0.000E+00	0.0000	3.643E-06	0.0026	9.976E-09	0.0000	7.332E-09	0.0000	1.055E-06	0.0008
U-234	1.512E-08	0.0000	6.487E-08	0.0000	0.000E+00	0.0000	9.722E-07	0.0007	3.208E-09	0.0000	7.863E-09	0.0000	3.076E-07	0.0002
U-235	2.075E-06	0.0015	3.826E-09	0.0000	0.000E+00	0.0000	6.617E-08	0.0000	2.224E-10	0.0000	5.330E-10	0.0000	2.108E-08	0.0000
U-238	2.689E-06	0.0019	2.239E-08	0.0000	0.000E+00	0.0000	5.184E-07	0.0004	1.711E-09	0.0000	4.194E-09	0.0000	1.721E-07	0.0001
Total	9.424E-04	0.6715	7.848E-07	0.0006	0.000E+00	0.0000	4.433E-04	0.3159	1.437E-06	0.0010	1.063E-06	0.0008	1.435E-05	0.0102

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.693E-04	0.1207
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.212E-03	0.8640
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.463E-05	0.0104
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.371E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.167E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.408E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.403E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	3.857E-07	7.064E-04	8.422E-07	1.893E-07	1.320E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.394E-04
Pa-231	2.685E-06	1.916E-02	4.061E-04	5.412E-07	9.186E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.048E-02
Pb-210	3.720E-01	2.671E+03	9.197E+00	4.463E+00	1.273E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.812E+03
Ra-226	3.738E-01	1.070E+04	3.118E+01	3.818E+01	1.279E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.089E+04
Th-230	4.825E-01	3.455E+02	7.102E-01	5.066E-02	1.651E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.113E+02
U-234	1.907E-01	3.412E+02	1.126E+00	2.760E+00	6.526E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.104E+02
U-235	1.265E-02	2.263E+01	7.468E-02	1.831E-01	4.329E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.722E+01
U-238	8.028E-02	1.436E+02	4.739E-01	1.162E+00	2.747E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.727E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.749E-10	0.0000	1.390E-11	0.0000	7.851E-11	0.0000	4.973E-14	0.0000	2.111E-14	0.0000	2.640E-11	0.0000
Pa-231	2.796E-10	0.0000	9.093E-12	0.0000	3.228E-10	0.0000	6.875E-12	0.0000	9.024E-15	0.0000	2.558E-11	0.0000
Pb-210	4.797E-07	0.0003	1.510E-07	0.0001	2.748E-04	0.1957	9.462E-07	0.0007	4.592E-07	0.0003	1.004E-05	0.0071
Ra-226	9.377E-04	0.6680	1.303E-07	0.0001	1.655E-04	0.1179	4.824E-07	0.0003	5.907E-07	0.0004	2.805E-06	0.0020
Th-230	1.210E-07	0.0001	4.122E-07	0.0003	1.232E-06	0.0009	2.533E-09	0.0000	1.807E-10	0.0000	9.997E-07	0.0007
U-234	1.467E-08	0.0000	6.452E-08	0.0000	9.672E-07	0.0007	3.191E-09	0.0000	7.824E-09	0.0000	3.060E-07	0.0002
U-235	2.064E-06	0.0015	3.792E-09	0.0000	6.556E-08	0.0000	2.163E-10	0.0000	5.303E-10	0.0000	2.094E-08	0.0000
U-238	2.676E-06	0.0019	2.228E-08	0.0000	5.158E-07	0.0004	1.702E-09	0.0000	4.173E-09	0.0000	1.712E-07	0.0001
Total	9.430E-04	0.6718	7.840E-07	0.0006	4.431E-04	0.3156	1.436E-06	0.0010	1.063E-06	0.0008	1.434E-05	0.0102

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.094E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.440E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.868E-04	0.2043
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.107E-03	0.7888
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.768E-06	0.0020
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.363E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.155E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.391E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.404E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	2.278E-07	0.0002	7.170E-08	0.0001	0.000E+00	0.0000	1.301E-04	0.0927	4.446E-07	0.0003	2.166E-07	0.0002	4.766E-06	0.0034
Ra-226	9.249E-04	0.6589	2.070E-07	0.0001	0.000E+00	0.0000	3.067E-04	0.2185	9.730E-07	0.0007	8.230E-07	0.0006	7.990E-06	0.0057
Th-230	1.312E-05	0.0094	4.147E-07	0.0003	0.000E+00	0.0000	4.785E-06	0.0034	1.359E-08	0.0000	1.046E-08	0.0000	1.084E-06	0.0008
U-234	1.532E-08	0.0000	6.456E-08	0.0000	0.000E+00	0.0000	9.674E-07	0.0007	3.192E-09	0.0000	7.824E-09	0.0000	3.061E-07	0.0002
U-235	2.065E-06	0.0015	3.815E-09	0.0000	0.000E+00	0.0000	6.596E-08	0.0000	2.232E-10	0.0000	5.304E-10	0.0000	2.099E-08	0.0000
U-238	2.676E-06	0.0019	2.228E-08	0.0000	0.000E+00	0.0000	5.158E-07	0.0004	1.702E-09	0.0000	4.173E-09	0.0000	1.712E-07	0.0001
Total	9.430E-04	0.6718	7.840E-07	0.0006	0.000E+00	0.0000	4.431E-04	0.3156	1.436E-06	0.0010	1.063E-06	0.0008	1.434E-05	0.0102

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.358E-04	0.0967
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.242E-03	0.8845
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.943E-05	0.0138
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.364E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.157E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.391E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.404E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	2.850E-06	5.147E-03	3.112E-06	1.384E-06	9.751E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.127E-03
Pa-231	7.987E-06	5.710E-02	1.217E-03	1.594E-06	2.733E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.105E-02
Pb-210	3.705E-01	2.660E+03	9.160E+00	4.445E+00	1.268E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.800E+03
Ra-226	3.745E-01	1.072E+04	3.124E+01	3.825E+01	1.282E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.092E+04
Th-230	4.820E-01	3.451E+02	7.095E-01	5.061E-02	1.649E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.108E+02
U-234	1.880E-01	3.364E+02	1.110E+00	2.721E+00	6.432E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.045E+02
U-235	1.247E-02	2.231E+01	7.361E-02	1.805E-01	4.267E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.683E+01
U-238	7.913E-02	1.416E+02	4.671E-01	1.145E+00	2.708E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.703E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	2.493E-09	0.0000	3.555E-11	0.0000	2.002E-10	0.0000	1.006E-13	0.0000	5.387E-14	0.0000	6.752E-11	0.0000
Pa-231	4.995E-10	0.0000	1.624E-11	0.0000	5.768E-10	0.0000	1.230E-11	0.0000	1.608E-14	0.0000	4.568E-11	0.0000
Pb-210	4.787E-07	0.0003	1.507E-07	0.0001	2.742E-04	0.1952	9.444E-07	0.0007	4.583E-07	0.0003	1.002E-05	0.0071
Ra-226	9.395E-04	0.6686	1.305E-07	0.0001	1.658E-04	0.1180	4.833E-07	0.0003	5.919E-07	0.0004	2.811E-06	0.0020
Th-230	1.209E-07	0.0001	4.118E-07	0.0003	1.231E-06	0.0009	2.531E-09	0.0000	1.806E-10	0.0000	9.987E-07	0.0007
U-234	1.446E-08	0.0000	6.360E-08	0.0000	9.533E-07	0.0007	3.145E-09	0.0000	7.711E-09	0.0000	3.016E-07	0.0002
U-235	2.034E-06	0.0014	3.737E-09	0.0000	6.462E-08	0.0000	2.132E-10	0.0000	5.227E-10	0.0000	2.064E-08	0.0000
U-238	2.638E-06	0.0019	2.196E-08	0.0000	5.084E-07	0.0004	1.677E-09	0.0000	4.113E-09	0.0000	1.687E-07	0.0001
Total	9.448E-04	0.6723	7.823E-07	0.0006	4.428E-04	0.3151	1.435E-06	0.0010	1.063E-06	0.0008	1.432E-05	0.0102

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.797E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.151E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.863E-04	0.2037
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.109E-03	0.7895
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.765E-06	0.0020
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.344E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.124E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.343E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.405E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.212E-07	0.0001	3.815E-08	0.0000	0.000E+00	0.0000	6.921E-05	0.0493	2.366E-07	0.0002	1.153E-07	0.0001	2.536E-06	0.0018
Ra-226	9.165E-04	0.6523	2.380E-07	0.0002	0.000E+00	0.0000	3.635E-04	0.2587	1.168E-06	0.0008	9.148E-07	0.0007	1.010E-05	0.0072
Th-230	2.342E-05	0.0167	4.167E-07	0.0003	0.000E+00	0.0000	8.567E-06	0.0061	2.568E-08	0.0000	2.024E-08	0.0000	1.186E-06	0.0008
U-234	1.641E-08	0.0000	6.366E-08	0.0000	0.000E+00	0.0000	9.540E-07	0.0007	3.147E-09	0.0000	7.712E-09	0.0000	3.018E-07	0.0002
U-235	2.037E-06	0.0014	3.789E-09	0.0000	0.000E+00	0.0000	6.540E-08	0.0000	2.256E-10	0.0000	5.228E-10	0.0000	2.075E-08	0.0000
U-238	2.638E-06	0.0019	2.196E-08	0.0000	0.000E+00	0.0000	5.085E-07	0.0004	1.678E-09	0.0000	4.113E-09	0.0000	1.688E-07	0.0001
Total	9.448E-04	0.6723	7.823E-07	0.0006	0.000E+00	0.0000	4.428E-04	0.3151	1.435E-06	0.0010	1.063E-06	0.0008	1.432E-05	0.0102

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.226E-05	0.0514
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.292E-03	0.9198
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.363E-05	0.0239
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.347E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.128E-06	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.343E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.405E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.818E-05	3.269E-02	1.320E-05	8.804E-06	6.222E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.894E-02
Pa-231	2.586E-05	1.850E-01	3.949E-03	5.144E-06	8.849E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.978E-01
Pb-210	3.707E-01	2.661E+03	9.165E+00	4.448E+00	1.268E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.802E+03
Ra-226	3.770E-01	1.079E+04	3.144E+01	3.850E+01	1.290E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.099E+04
Th-230	4.803E-01	3.440E+02	7.071E-01	5.044E-02	1.644E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.091E+02
U-234	1.787E-01	3.198E+02	1.055E+00	2.587E+00	6.115E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.845E+02
U-235	1.185E-02	2.121E+01	6.998E-02	1.716E-01	4.057E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.551E+01
U-238	7.523E-02	1.346E+02	4.441E-01	1.089E+00	2.574E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.619E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.600E-09	0.0000	1.369E-10	0.0000	7.687E-10	0.0000	3.027E-13	0.0000	2.070E-13	0.0000	2.600E-10	0.0000
Pa-231	1.240E-09	0.0000	4.033E-11	0.0000	1.433E-09	0.0000	3.060E-11	0.0000	3.984E-14	0.0000	1.134E-10	0.0000
Pb-210	4.800E-07	0.0003	1.511E-07	0.0001	2.749E-04	0.1946	9.469E-07	0.0007	4.595E-07	0.0003	1.004E-05	0.0071
Ra-226	9.456E-04	0.6693	1.314E-07	0.0001	1.669E-04	0.1181	4.865E-07	0.0003	5.957E-07	0.0004	2.829E-06	0.0020
Th-230	1.205E-07	0.0001	4.104E-07	0.0003	1.227E-06	0.0009	2.522E-09	0.0000	1.799E-10	0.0000	9.953E-07	0.0007
U-234	1.374E-08	0.0000	6.046E-08	0.0000	9.062E-07	0.0006	2.990E-09	0.0000	7.331E-09	0.0000	2.867E-07	0.0002
U-235	1.934E-06	0.0014	3.553E-09	0.0000	6.144E-08	0.0000	2.027E-10	0.0000	4.970E-10	0.0000	1.962E-08	0.0000
U-238	2.508E-06	0.0018	2.088E-08	0.0000	4.834E-07	0.0003	1.595E-09	0.0000	3.910E-09	0.0000	1.604E-07	0.0001
Total	9.506E-04	0.6729	7.779E-07	0.0006	4.445E-04	0.3147	1.441E-06	0.0010	1.067E-06	0.0008	1.433E-05	0.0101

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.077E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.858E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.870E-04	0.2032
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.117E-03	0.7903
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.756E-06	0.0020
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.277E-06	0.0009
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.020E-06	0.0014
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.178E-06	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.413E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	1.333E-08	0.0000	4.194E-09	0.0000	0.000E+00	0.0000	7.608E-06	0.0054	2.601E-08	0.0000	1.267E-08	0.0000	2.788E-07	0.0002
Ra-226	8.875E-04	0.6282	2.632E-07	0.0002	0.000E+00	0.0000	4.114E-04	0.2912	1.334E-06	0.0009	9.847E-07	0.0007	1.196E-05	0.0085
Th-230	5.862E-05	0.0415	4.252E-07	0.0003	0.000E+00	0.0000	2.411E-05	0.0171	7.594E-08	0.0001	5.801E-08	0.0000	1.628E-06	0.0012
U-234	2.569E-08	0.0000	6.062E-08	0.0000	0.000E+00	0.0000	9.108E-07	0.0006	3.004E-09	0.0000	7.341E-09	0.0000	2.872E-07	0.0002
U-235	1.945E-06	0.0014	3.731E-09	0.0000	0.000E+00	0.0000	6.364E-08	0.0000	2.336E-10	0.0000	4.973E-10	0.0000	2.000E-08	0.0000
U-238	2.508E-06	0.0018	2.088E-08	0.0000	0.000E+00	0.0000	4.835E-07	0.0003	1.595E-09	0.0000	3.911E-09	0.0000	1.605E-07	0.0001
Total	9.506E-04	0.6729	7.779E-07	0.0006	0.000E+00	0.0000	4.445E-04	0.3147	1.441E-06	0.0010	1.067E-06	0.0008	1.433E-05	0.0101

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.943E-06	0.0056
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.313E-03	0.9297
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.492E-05	0.0601
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.295E-06	0.0009
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.033E-06	0.0014
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.178E-06	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.413E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	6.451E-05	1.159E-01	4.145E-05	3.121E-05	2.207E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.380E-01
Pa-231	7.144E-05	5.112E-01	1.092E-02	1.420E-05	2.445E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.465E-01
Pb-210	3.768E-01	2.705E+03	9.317E+00	4.522E+00	1.289E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.848E+03
Ra-226	3.833E-01	1.097E+04	3.198E+01	3.915E+01	1.312E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.117E+04
Th-230	4.756E-01	3.406E+02	7.001E-01	4.994E-02	1.627E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.041E+02
U-234	1.546E-01	2.767E+02	9.130E-01	2.238E+00	5.292E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.328E+02
U-235	1.026E-02	1.836E+01	6.058E-02	1.485E-01	3.512E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.208E+01
U-238	6.513E-02	1.165E+02	3.845E-01	9.427E-01	2.229E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.401E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.977E-08	0.0000	4.244E-10	0.0000	2.382E-09	0.0000	8.498E-13	0.0000	6.415E-13	0.0000	8.061E-10	0.0000
Pa-231	3.130E-09	0.0000	1.018E-10	0.0000	3.616E-09	0.0000	7.724E-11	0.0000	1.004E-13	0.0000	2.862E-10	0.0000
Pb-210	4.880E-07	0.0003	1.536E-07	0.0001	2.795E-04	0.1947	9.627E-07	0.0007	4.672E-07	0.0003	1.021E-05	0.0071
Ra-226	9.613E-04	0.6698	1.336E-07	0.0001	1.697E-04	0.1182	4.946E-07	0.0003	6.056E-07	0.0004	2.876E-06	0.0020
Th-230	1.193E-07	0.0001	4.063E-07	0.0003	1.215E-06	0.0008	2.497E-09	0.0000	1.782E-10	0.0000	9.855E-07	0.0007
U-234	1.189E-08	0.0000	5.232E-08	0.0000	7.843E-07	0.0005	2.588E-09	0.0000	6.344E-09	0.0000	2.481E-07	0.0002
U-235	1.674E-06	0.0012	3.076E-09	0.0000	5.319E-08	0.0000	1.755E-10	0.0000	4.303E-10	0.0000	1.699E-08	0.0000
U-238	2.171E-06	0.0015	1.807E-08	0.0000	4.185E-07	0.0003	1.381E-09	0.0000	3.385E-09	0.0000	1.389E-07	0.0001
Total	9.658E-04	0.6729	7.675E-07	0.0005	4.517E-04	0.3147	1.464E-06	0.0010	1.083E-06	0.0008	1.448E-05	0.0101

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.338E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.211E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.918E-04	0.2033
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.135E-03	0.7909
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.729E-06	0.0019
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.106E-06	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.748E-06	0.0012
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.751E-06	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.435E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	2.427E-11	0.0000	7.638E-12	0.0000	0.000E+00	0.0000	1.385E-08	0.0000	4.736E-11	0.0000	2.308E-11	0.0000	5.077E-10	0.0000
Ra-226	8.094E-04	0.5639	2.439E-07	0.0002	0.000E+00	0.0000	3.821E-04	0.2662	1.240E-06	0.0009	9.095E-07	0.0006	1.116E-05	0.0078
Th-230	1.525E-04	0.1062	4.492E-07	0.0003	0.000E+00	0.0000	6.831E-05	0.0476	2.194E-07	0.0002	1.633E-07	0.0001	2.908E-06	0.0020
U-234	9.392E-08	0.0001	5.274E-08	0.0000	0.000E+00	0.0000	8.194E-07	0.0006	2.699E-09	0.0000	6.426E-09	0.0000	2.500E-07	0.0002
U-235	1.707E-06	0.0012	3.602E-09	0.0000	0.000E+00	0.0000	5.919E-08	0.0000	2.536E-10	0.0000	4.310E-10	0.0000	1.808E-08	0.0000
U-238	2.171E-06	0.0015	1.809E-08	0.0000	0.000E+00	0.0000	4.188E-07	0.0003	1.382E-09	0.0000	3.387E-09	0.0000	1.390E-07	0.0001
Total	9.658E-04	0.6729	7.675E-07	0.0005	0.000E+00	0.0000	4.517E-04	0.3147	1.464E-06	0.0010	1.083E-06	0.0008	1.448E-05	0.0101

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.446E-08	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.205E-03	0.8395
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.245E-04	0.1564
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.225E-06	0.0009
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.789E-06	0.0012
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-06	0.0019
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.435E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.761E-04	1.757E-01	8.996E-05	7.693E-05	6.025E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.361E-01
Pa-231	1.802E-04	7.165E-01	2.050E-02	2.747E-05	6.167E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.987E-01
Pb-210	3.923E-01	1.565E+03	7.199E+00	3.606E+00	1.343E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.710E+03
Ra-226	3.986E-01	6.338E+03	2.077E+01	2.598E+01	1.364E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.522E+03
Th-230	4.592E-01	1.828E+02	6.400E-01	4.610E-02	1.571E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.406E+02
U-234	9.324E-02	9.272E+01	4.884E-01	1.220E+00	3.191E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.263E+02
U-235	6.194E-03	6.160E+00	3.245E-02	8.107E-02	2.120E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.393E+00
U-238	3.931E-02	3.909E+01	2.059E-01	5.145E-01	1.345E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.326E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	7.823E-08	0.0001	1.115E-09	0.0000	3.412E-09	0.0000	1.770E-12	0.0000	1.518E-12	0.0000	2.117E-09	0.0000
Pa-231	7.639E-09	0.0000	2.482E-10	0.0000	4.814E-09	0.0000	1.391E-10	0.0000	1.867E-13	0.0000	6.983E-10	0.0000
Pb-210	5.078E-07	0.0004	1.598E-07	0.0001	1.587E-04	0.1244	7.375E-07	0.0006	3.698E-07	0.0003	1.062E-05	0.0083
Ra-226	9.993E-04	0.7833	1.388E-07	0.0001	9.622E-05	0.0754	3.168E-07	0.0002	3.964E-07	0.0003	2.989E-06	0.0023
Th-230	1.152E-07	0.0001	3.923E-07	0.0003	6.404E-07	0.0005	2.280E-09	0.0000	1.643E-10	0.0000	9.515E-07	0.0007
U-234	7.170E-09	0.0000	3.154E-08	0.0000	2.581E-07	0.0002	1.380E-09	0.0000	3.450E-09	0.0000	1.496E-07	0.0001
U-235	1.011E-06	0.0008	1.857E-09	0.0000	1.752E-08	0.0000	9.372E-11	0.0000	2.343E-10	0.0000	1.025E-08	0.0000
U-238	1.311E-06	0.0010	1.091E-08	0.0000	1.379E-07	0.0001	7.373E-10	0.0000	1.843E-09	0.0000	8.384E-08	0.0001
Total	1.002E-03	0.7857	7.366E-07	0.0006	2.560E-04	0.2007	1.059E-06	0.0008	7.719E-07	0.0006	1.481E-05	0.0116

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.487E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.711E-04	0.1341
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.099E-03	0.8618
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.102E-06	0.0016
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.512E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.041E-06	0.0008
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.546E-06	0.0012
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.276E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	6.254E-21	0.0000	1.968E-21	0.0000	0.000E+00	0.0000	1.953E-18	0.0000	9.020E-21	0.0000	4.536E-21	0.0000	1.308E-19	0.0000
Ra-226	5.862E-04	0.4596	1.766E-07	0.0001	0.000E+00	0.0000	1.510E-04	0.1184	6.251E-07	0.0005	4.528E-07	0.0004	8.082E-06	0.0063
Th-230	4.130E-04	0.3238	5.131E-07	0.0004	0.000E+00	0.0000	1.044E-04	0.0819	4.308E-07	0.0003	3.131E-07	0.0002	6.471E-06	0.0051
U-234	6.502E-07	0.0005	3.272E-08	0.0000	0.000E+00	0.0000	4.184E-07	0.0003	2.040E-09	0.0000	3.928E-09	0.0000	1.603E-07	0.0001
U-235	1.097E-06	0.0009	3.220E-09	0.0000	0.000E+00	0.0000	2.575E-08	0.0000	2.346E-10	0.0000	2.360E-10	0.0000	1.307E-08	0.0000
U-238	1.311E-06	0.0010	1.095E-08	0.0000	0.000E+00	0.0000	1.382E-07	0.0001	7.393E-10	0.0000	1.847E-09	0.0000	8.402E-08	0.0001
Total	1.002E-03	0.7857	7.366E-07	0.0006	0.000E+00	0.0000	2.560E-04	0.2007	1.059E-06	0.0008	7.719E-07	0.0006	1.481E-05	0.0116

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.106E-18	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.466E-04	0.5852
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.252E-04	0.4117
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.268E-06	0.0010
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.140E-06	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.547E-06	0.0012
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.276E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(7,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(5,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(6,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(7,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(6,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(7,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(7,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(5,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(6,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(7,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(8,5)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

0

Menu	Parameter	Current Value	Default	Parameter Name
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.380E-02	8.424E+00	1.635E-03	2.272E-03	1.611E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.004E+01
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	1.962E-01	4.790E+02	1.637E+00	7.979E-01	2.291E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.044E+02
Ra-226	1.962E-01	1.916E+03	5.585E+00	6.838E+00	2.291E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.951E+03
Th-230	3.817E-01	9.323E+01	1.917E-01	1.367E-02	4.456E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.380E+02
U-234	1.044E-01	6.371E+01	2.102E-01	5.154E-01	1.218E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.662E+01
U-235	2.113E-02	1.290E+01	4.256E-02	1.043E-01	2.467E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.551E+01
U-238	1.432E-01	8.740E+01	2.884E-01	7.070E-01	1.672E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.051E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.126E-06	0.0067	5.569E-08	0.0001	1.062E-07	0.0002	2.063E-11	0.0000	2.864E-11	0.0000	3.609E-08	0.0001
Pa-231	2.964E-10	0.0000	9.094E-12	0.0000	1.101E-10	0.0000	2.341E-12	0.0000	3.089E-15	0.0000	8.727E-12	0.0000
Pb-210	2.697E-07	0.0004	7.968E-08	0.0001	4.946E-05	0.0803	1.702E-07	0.0003	8.263E-08	0.0001	1.807E-06	0.0029
Ra-226	5.187E-04	0.8421	6.868E-08	0.0001	2.977E-05	0.0483	8.677E-08	0.0001	1.063E-07	0.0002	5.046E-07	0.0008
Th-230	1.018E-07	0.0002	3.261E-07	0.0005	3.326E-07	0.0005	6.838E-10	0.0000	4.878E-11	0.0000	2.699E-07	0.0004
U-234	8.610E-09	0.0000	3.539E-08	0.0001	1.810E-07	0.0003	5.971E-10	0.0000	1.464E-09	0.0000	5.727E-08	0.0001
U-235	3.667E-06	0.0060	6.349E-09	0.0000	3.745E-08	0.0001	1.236E-10	0.0000	3.030E-10	0.0000	1.196E-08	0.0000
U-238	5.036E-06	0.0082	3.982E-08	0.0001	3.146E-07	0.0005	1.038E-09	0.0000	2.545E-09	0.0000	1.044E-07	0.0002
Total	5.319E-04	0.8635	6.118E-07	0.0010	8.020E-05	0.1302	2.595E-07	0.0004	1.933E-07	0.0003	2.791E-06	0.0045

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.324E-06	0.0070
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.266E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.187E-05	0.0842
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.493E-04	0.8917
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.031E-06	0.0017
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.843E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.723E-06	0.0060
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.498E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.160E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.125E-06	0.0067	5.568E-08	0.0001	0.000E+00	0.0000	1.062E-07	0.0002	2.061E-11	0.0000	2.864E-11	0.0000	3.608E-08	0.0001
Pb-210	1.750E-07	0.0003	5.171E-08	0.0001	0.000E+00	0.0000	3.200E-05	0.0520	1.094E-07	0.0002	5.331E-08	0.0001	1.173E-06	0.0019
Ra-226	5.123E-04	0.8317	9.553E-08	0.0002	0.000E+00	0.0000	4.670E-05	0.0758	1.460E-07	0.0002	1.340E-07	0.0002	1.127E-06	0.0018
Th-230	6.589E-06	0.0107	3.272E-07	0.0005	0.000E+00	0.0000	8.614E-07	0.0014	2.312E-09	0.0000	1.635E-09	0.0000	2.818E-07	0.0005
U-234	8.773E-09	0.0000	3.540E-08	0.0001	0.000E+00	0.0000	1.810E-07	0.0003	5.972E-10	0.0000	1.464E-09	0.0000	5.727E-08	0.0001
U-235	3.668E-06	0.0060	6.369E-09	0.0000	0.000E+00	0.0000	3.758E-08	0.0001	1.259E-10	0.0000	3.030E-10	0.0000	1.198E-08	0.0000
U-238	5.036E-06	0.0082	3.982E-08	0.0001	0.000E+00	0.0000	3.146E-07	0.0005	1.038E-09	0.0000	2.545E-09	0.0000	1.044E-07	0.0002
Total	5.319E-04	0.8635	6.118E-07	0.0010	0.000E+00	0.0000	8.020E-05	0.1302	2.595E-07	0.0004	1.933E-07	0.0003	2.791E-06	0.0045

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.323E-06	0.0070
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.357E-05	0.0545
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.605E-04	0.9100
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.063E-06	0.0131
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.845E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.724E-06	0.0060
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.498E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.160E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.337E-02	8.160E+00	1.584E-03	2.200E-03	1.561E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.724E+00
Pa-231	4.470E-07	1.062E-03	2.084E-05	3.478E-08	5.218E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.135E-03
Pb-210	1.962E-01	4.804E+02	1.654E+00	8.029E-01	2.290E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.058E+02
Ra-226	1.963E-01	1.917E+03	5.586E+00	6.840E+00	2.292E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.952E+03
Th-230	3.817E-01	9.323E+01	1.917E-01	1.367E-02	4.456E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.380E+02
U-234	1.043E-01	6.367E+01	2.101E-01	5.151E-01	1.218E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.658E+01
U-235	2.112E-02	1.289E+01	4.254E-02	1.043E-01	2.466E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.550E+01
U-238	1.431E-01	8.735E+01	2.882E-01	7.066E-01	1.671E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.051E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	3.997E-06	0.0065	5.394E-08	0.0001	1.029E-07	0.0002	1.998E-11	0.0000	2.774E-11	0.0000	3.495E-08	0.0001
Pa-231	3.161E-10	0.0000	9.699E-12	0.0000	1.174E-10	0.0000	2.496E-12	0.0000	3.295E-15	0.0000	9.307E-12	0.0000
Pb-210	2.697E-07	0.0004	7.967E-08	0.0001	4.947E-05	0.0803	1.704E-07	0.0003	8.267E-08	0.0001	1.807E-06	0.0029
Ra-226	5.189E-04	0.8423	6.871E-08	0.0001	2.978E-05	0.0483	8.680E-08	0.0001	1.063E-07	0.0002	5.048E-07	0.0008
Th-230	1.018E-07	0.0002	3.261E-07	0.0005	3.326E-07	0.0005	6.838E-10	0.0000	4.878E-11	0.0000	2.698E-07	0.0004
U-234	8.605E-09	0.0000	3.537E-08	0.0001	1.809E-07	0.0003	5.968E-10	0.0000	1.463E-09	0.0000	5.723E-08	0.0001
U-235	3.664E-06	0.0059	6.345E-09	0.0000	3.743E-08	0.0001	1.235E-10	0.0000	3.028E-10	0.0000	1.196E-08	0.0000
U-238	5.033E-06	0.0082	3.980E-08	0.0001	3.144E-07	0.0005	1.037E-09	0.0000	2.543E-09	0.0000	1.044E-07	0.0002
Total	5.320E-04	0.8635	6.100E-07	0.0010	8.022E-05	0.1302	2.596E-07	0.0004	1.934E-07	0.0003	2.790E-06	0.0045

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.188E-06	0.0068
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.550E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.188E-05	0.0842
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.495E-04	0.8919
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.031E-06	0.0017
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.842E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.721E-06	0.0060
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.495E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.161E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.996E-06	0.0065	5.393E-08	0.0001	0.000E+00	0.0000	1.029E-07	0.0002	1.996E-11	0.0000	2.774E-11	0.0000	3.495E-08	0.0001
Pb-210	1.696E-07	0.0003	5.011E-08	0.0001	0.000E+00	0.0000	3.101E-05	0.0503	1.060E-07	0.0002	5.166E-08	0.0001	1.136E-06	0.0018
Ra-226	5.121E-04	0.8312	9.707E-08	0.0002	0.000E+00	0.0000	4.767E-05	0.0774	1.494E-07	0.0002	1.356E-07	0.0002	1.162E-06	0.0019
Th-230	7.020E-06	0.0114	3.273E-07	0.0005	0.000E+00	0.0000	9.011E-07	0.0015	2.435E-09	0.0000	1.748E-09	0.0000	2.828E-07	0.0005
U-234	8.784E-09	0.0000	3.538E-08	0.0001	0.000E+00	0.0000	1.809E-07	0.0003	5.968E-10	0.0000	1.463E-09	0.0000	5.724E-08	0.0001
U-235	3.666E-06	0.0060	6.367E-09	0.0000	0.000E+00	0.0000	3.757E-08	0.0001	1.260E-10	0.0000	3.028E-10	0.0000	1.197E-08	0.0000
U-238	5.033E-06	0.0082	3.980E-08	0.0001	0.000E+00	0.0000	3.144E-07	0.0005	1.037E-09	0.0000	2.543E-09	0.0000	1.044E-07	0.0002
Total	5.320E-04	0.8635	6.100E-07	0.0010	0.000E+00	0.0000	8.022E-05	0.1302	2.596E-07	0.0004	1.934E-07	0.0003	2.790E-06	0.0045

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.188E-06	0.0068
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.253E-05	0.0528
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.613E-04	0.9111
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.536E-06	0.0139
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.844E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.722E-06	0.0060
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.495E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.161E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.254E-02	7.655E+00	1.486E-03	2.064E-03	1.464E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.123E+00
Pa-231	1.340E-06	3.242E-03	6.742E-05	9.530E-08	1.564E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.466E-03
Pb-210	1.960E-01	4.801E+02	1.653E+00	8.024E-01	2.289E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.055E+02
Ra-226	1.965E-01	1.918E+03	5.590E+00	6.846E+00	2.294E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.953E+03
Th-230	3.816E-01	9.322E+01	1.916E-01	1.367E-02	4.455E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.380E+02
U-234	1.042E-01	6.360E+01	2.098E-01	5.145E-01	1.216E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.649E+01
U-235	2.110E-02	1.288E+01	4.249E-02	1.042E-01	2.463E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.549E+01
U-238	1.429E-01	8.725E+01	2.879E-01	7.058E-01	1.669E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.049E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.750E-06	0.0061	5.061E-08	0.0001	9.653E-08	0.0002	1.875E-11	0.0000	2.603E-11	0.0000	3.279E-08	0.0001
Pa-231	3.554E-10	0.0000	1.091E-11	0.0000	1.320E-10	0.0000	2.808E-12	0.0000	3.701E-15	0.0000	1.047E-11	0.0000
Pb-210	2.696E-07	0.0004	7.966E-08	0.0001	4.946E-05	0.0803	1.703E-07	0.0003	8.266E-08	0.0001	1.806E-06	0.0029
Ra-226	5.193E-04	0.8428	6.876E-08	0.0001	2.981E-05	0.0484	8.687E-08	0.0001	1.064E-07	0.0002	5.052E-07	0.0008
Th-230	1.018E-07	0.0002	3.261E-07	0.0005	3.326E-07	0.0005	6.837E-10	0.0000	4.878E-11	0.0000	2.698E-07	0.0004
U-234	8.596E-09	0.0000	3.533E-08	0.0001	1.807E-07	0.0003	5.961E-10	0.0000	1.462E-09	0.0000	5.717E-08	0.0001
U-235	3.660E-06	0.0059	6.338E-09	0.0000	3.739E-08	0.0001	1.234E-10	0.0000	3.024E-10	0.0000	1.194E-08	0.0000
U-238	5.027E-06	0.0082	3.975E-08	0.0001	3.141E-07	0.0005	1.036E-09	0.0000	2.540E-09	0.0000	1.042E-07	0.0002
Total	5.321E-04	0.8636	6.066E-07	0.0010	8.023E-05	0.1302	2.597E-07	0.0004	1.934E-07	0.0003	2.788E-06	0.0045

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.930E-06	0.0064
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.116E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.187E-05	0.0842
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.499E-04	0.8924
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.031E-06	0.0017
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.838E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.716E-06	0.0060
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.489E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.162E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.749E-06	0.0061	5.060E-08	0.0001	0.000E+00	0.0000	9.650E-08	0.0002	1.873E-11	0.0000	2.602E-11	0.0000	3.279E-08	0.0001
Pb-210	1.593E-07	0.0003	4.706E-08	0.0001	0.000E+00	0.0000	2.912E-05	0.0473	9.955E-08	0.0002	4.851E-08	0.0001	1.067E-06	0.0017
Ra-226	5.116E-04	0.8303	1.000E-07	0.0002	0.000E+00	0.0000	4.949E-05	0.0803	1.556E-07	0.0003	1.386E-07	0.0002	1.229E-06	0.0020
Th-230	7.882E-06	0.0128	3.274E-07	0.0005	0.000E+00	0.0000	9.829E-07	0.0016	2.692E-09	0.0000	1.978E-09	0.0000	2.848E-07	0.0005
U-234	8.811E-09	0.0000	3.534E-08	0.0001	0.000E+00	0.0000	1.807E-07	0.0003	5.962E-10	0.0000	1.462E-09	0.0000	5.718E-08	0.0001
U-235	3.662E-06	0.0059	6.363E-09	0.0000	0.000E+00	0.0000	3.755E-08	0.0001	1.262E-10	0.0000	3.025E-10	0.0000	1.196E-08	0.0000
U-238	5.027E-06	0.0082	3.976E-08	0.0001	0.000E+00	0.0000	3.141E-07	0.0005	1.036E-09	0.0000	2.541E-09	0.0000	1.042E-07	0.0002
Total	5.321E-04	0.8636	6.066E-07	0.0010	0.000E+00	0.0000	8.023E-05	0.1302	2.597E-07	0.0004	1.934E-07	0.0003	2.788E-06	0.0045

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.929E-06	0.0064
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.054E-05	0.0496
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.628E-04	0.9133
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.482E-06	0.0154
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.841E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.718E-06	0.0060
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.489E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.162E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.003E-02	6.123E+00	1.189E-03	1.651E-03	1.171E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.296E+00
Pa-231	4.456E-06	1.085E-02	2.300E-04	3.065E-07	5.203E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.160E-02
Pb-210	1.957E-01	4.794E+02	1.651E+00	8.012E-01	2.285E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.047E+02
Ra-226	1.970E-01	1.923E+03	5.605E+00	6.864E+00	2.300E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.959E+03
Th-230	3.815E-01	9.320E+01	1.916E-01	1.367E-02	4.454E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.379E+02
U-234	1.038E-01	6.335E+01	2.090E-01	5.125E-01	1.212E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.619E+01
U-235	2.101E-02	1.283E+01	4.232E-02	1.038E-01	2.453E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.543E+01
U-238	1.424E-01	8.691E+01	2.867E-01	7.030E-01	1.662E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.045E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.000E-06	0.0049	4.049E-08	0.0001	7.722E-08	0.0001	1.501E-11	0.0000	2.082E-11	0.0000	2.624E-08	0.0000
Pa-231	4.927E-10	0.0000	1.512E-11	0.0000	1.831E-10	0.0000	3.900E-12	0.0000	5.119E-15	0.0000	1.451E-11	0.0000
Pb-210	2.696E-07	0.0004	7.965E-08	0.0001	4.946E-05	0.0802	1.703E-07	0.0003	8.266E-08	0.0001	1.806E-06	0.0029
Ra-226	5.207E-04	0.8441	6.894E-08	0.0001	2.989E-05	0.0484	8.710E-08	0.0001	1.067E-07	0.0002	5.065E-07	0.0008
Th-230	1.017E-07	0.0002	3.260E-07	0.0005	3.325E-07	0.0005	6.836E-10	0.0000	4.876E-11	0.0000	2.697E-07	0.0004
U-234	8.562E-09	0.0000	3.519E-08	0.0001	1.800E-07	0.0003	5.938E-10	0.0000	1.456E-09	0.0000	5.694E-08	0.0001
U-235	3.646E-06	0.0059	6.313E-09	0.0000	3.724E-08	0.0001	1.229E-10	0.0000	3.012E-10	0.0000	1.189E-08	0.0000
U-238	5.007E-06	0.0081	3.960E-08	0.0001	3.128E-07	0.0005	1.032E-09	0.0000	2.530E-09	0.0000	1.038E-07	0.0002
Total	5.327E-04	0.8636	5.962E-07	0.0010	8.028E-05	0.1301	2.599E-07	0.0004	1.937E-07	0.0003	2.782E-06	0.0045

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

	Water		Fish		Plant		Meat		Milk		All Pathways**	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.144E-06	0.0051
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.093E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.186E-05	0.0841
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.514E-04	0.8938
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.031E-06	0.0017
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.827E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.702E-06	0.0060
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.467E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.168E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.998E-06	0.0049	4.047E-08	0.0001	0.000E+00	0.0000	7.718E-08	0.0001	1.498E-11	0.0000	2.081E-11	0.0000	2.622E-08	0.0000
Pb-210	1.278E-07	0.0002	3.776E-08	0.0001	0.000E+00	0.0000	2.337E-05	0.0379	7.988E-08	0.0001	3.892E-08	0.0001	8.564E-07	0.0014
Ra-226	5.101E-04	0.8269	1.089E-07	0.0002	0.000E+00	0.0000	5.501E-05	0.0892	1.746E-07	0.0003	1.476E-07	0.0002	1.434E-06	0.0023
Th-230	1.089E-05	0.0177	3.279E-07	0.0005	0.000E+00	0.0000	1.291E-06	0.0021	3.667E-09	0.0000	2.823E-09	0.0000	2.926E-07	0.0005
U-234	8.937E-09	0.0000	3.521E-08	0.0001	0.000E+00	0.0000	1.800E-07	0.0003	5.938E-10	0.0000	1.456E-09	0.0000	5.695E-08	0.0001
U-235	3.648E-06	0.0059	6.351E-09	0.0000	0.000E+00	0.0000	3.747E-08	0.0001	1.268E-10	0.0000	3.013E-10	0.0000	1.192E-08	0.0000
U-238	5.007E-06	0.0081	3.960E-08	0.0001	0.000E+00	0.0000	3.128E-07	0.0005	1.032E-09	0.0000	2.531E-09	0.0000	1.038E-07	0.0002
Total	5.327E-04	0.8636	5.962E-07	0.0010	0.000E+00	0.0000	8.028E-05	0.1301	2.599E-07	0.0004	1.937E-07	0.0003	2.782E-06	0.0045

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.142E-06	0.0051
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.451E-05	0.0397
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.669E-04	0.9191
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-05	0.0208
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.831E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.704E-06	0.0060
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.467E-06	0.0089
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.168E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	5.302E-03	3.236E+00	6.293E-04	8.727E-04	6.190E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.857E+00
Pa-231	1.328E-05	3.239E-02	6.902E-04	9.045E-07	1.551E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.463E-02
Pb-210	1.956E-01	4.792E+02	1.650E+00	8.009E-01	2.284E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.045E+02
Ra-226	1.985E-01	1.938E+03	5.648E+00	6.917E+00	2.317E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.974E+03
Th-230	3.812E-01	9.312E+01	1.914E-01	1.366E-02	4.450E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.378E+02
U-234	1.026E-01	6.264E+01	2.067E-01	5.067E-01	1.198E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.533E+01
U-235	2.078E-02	1.268E+01	4.184E-02	1.026E-01	2.425E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.525E+01
U-238	1.408E-01	8.593E+01	2.835E-01	6.951E-01	1.643E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.033E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.588E-06	0.0026	2.143E-08	0.0000	4.088E-08	0.0001	7.968E-12	0.0000	1.102E-11	0.0000	1.389E-08	0.0000
Pa-231	8.814E-10	0.0000	2.704E-11	0.0000	3.277E-10	0.0000	6.989E-12	0.0000	9.133E-15	0.0000	2.595E-11	0.0000
Pb-210	2.702E-07	0.0004	7.984E-08	0.0001	4.958E-05	0.0800	1.707E-07	0.0003	8.286E-08	0.0001	1.811E-06	0.0029
Ra-226	5.246E-04	0.8468	6.946E-08	0.0001	3.011E-05	0.0486	8.776E-08	0.0001	1.075E-07	0.0002	5.103E-07	0.0008
Th-230	1.016E-07	0.0002	3.257E-07	0.0005	3.322E-07	0.0005	6.830E-10	0.0000	4.873E-11	0.0000	2.695E-07	0.0004
U-234	8.465E-09	0.0000	3.480E-08	0.0001	1.779E-07	0.0003	5.871E-10	0.0000	1.439E-09	0.0000	5.630E-08	0.0001
U-235	3.605E-06	0.0058	6.242E-09	0.0000	3.682E-08	0.0001	1.215E-10	0.0000	2.978E-10	0.0000	1.176E-08	0.0000
U-238	4.951E-06	0.0080	3.915E-08	0.0001	3.093E-07	0.0005	1.020E-09	0.0000	2.502E-09	0.0000	1.027E-07	0.0002
Total	5.351E-04	0.8638	5.767E-07	0.0009	8.058E-05	0.1301	2.609E-07	0.0004	1.946E-07	0.0003	2.775E-06	0.0045

1RESRAD, Version 6.2 T« Limit = 0.5 year 06/30/2002 15:08 Page 17
Intrisk : Painesville EU 5 - Subsistence Farmer 2002 File: Pnveu5sf2002.rad

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.664E-06	0.0027
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.269E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.199E-05	0.0839
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.555E-04	0.8966
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.030E-06	0.0017
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.795E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.660E-06	0.0059
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.405E-06	0.0087
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.195E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.583E-06	0.0026	2.137E-08	0.0000	0.000E+00	0.0000	4.076E-08	0.0001	7.911E-12	0.0000	1.099E-11	0.0000	1.385E-08	0.0000
Pb-210	6.815E-08	0.0001	2.013E-08	0.0000	0.000E+00	0.0000	1.246E-05	0.0201	4.259E-08	0.0001	2.075E-08	0.0000	4.566E-07	0.0007
Ra-226	5.055E-04	0.8159	1.252E-07	0.0002	0.000E+00	0.0000	6.524E-05	0.1053	2.097E-07	0.0003	1.641E-07	0.0003	1.814E-06	0.0029
Th-230	1.944E-05	0.0314	3.297E-07	0.0005	0.000E+00	0.0000	2.313E-06	0.0037	6.933E-09	0.0000	5.462E-09	0.0000	3.200E-07	0.0005
U-234	9.579E-09	0.0000	3.483E-08	0.0001	0.000E+00	0.0000	1.780E-07	0.0003	5.874E-10	0.0000	1.439E-09	0.0000	5.632E-08	0.0001
U-235	3.610E-06	0.0058	6.328E-09	0.0000	0.000E+00	0.0000	3.726E-08	0.0001	1.285E-10	0.0000	2.979E-10	0.0000	1.182E-08	0.0000
U-238	4.951E-06	0.0080	3.916E-08	0.0001	0.000E+00	0.0000	3.093E-07	0.0005	1.021E-09	0.0000	2.502E-09	0.0000	1.027E-07	0.0002
Total	5.351E-04	0.8638	5.767E-07	0.0009	0.000E+00	0.0000	8.058E-05	0.1301	2.609E-07	0.0004	1.946E-07	0.0003	2.775E-06	0.0045

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.659E-06	0.0027
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.307E-05	0.0211
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.730E-04	0.9250
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.241E-05	0.0362
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.808E-07	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.666E-06	0.0059
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.405E-06	0.0087
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.195E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	5.976E-04	3.649E-01	7.472E-05	9.838E-05	6.976E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.348E-01
Pa-231	4.326E-05	1.056E-01	2.254E-03	2.936E-06	5.051E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.129E-01
Pb-210	1.992E-01	4.879E+02	1.680E+00	8.155E-01	2.325E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.137E+02
Ra-226	2.036E-01	1.988E+03	5.795E+00	7.096E+00	2.377E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.025E+03
Th-230	3.801E-01	9.286E+01	1.909E-01	1.362E-02	4.438E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.374E+02
U-234	9.863E-02	6.021E+01	1.986E-01	4.870E-01	1.151E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.241E+01
U-235	1.997E-02	1.219E+01	4.022E-02	9.860E-02	2.331E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.466E+01
U-238	1.353E-01	8.259E+01	2.725E-01	6.681E-01	1.579E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.932E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.865E-07	0.0003	2.517E-09	0.0000	4.803E-09	0.0000	1.020E-12	0.0000	1.295E-12	0.0000	1.631E-09	0.0000
Pa-231	2.202E-09	0.0000	6.756E-11	0.0000	8.190E-10	0.0000	1.749E-11	0.0000	2.277E-14	0.0000	6.483E-11	0.0000
Pb-210	2.759E-07	0.0004	8.150E-08	0.0001	5.061E-05	0.0800	1.743E-07	0.0003	8.458E-08	0.0001	1.848E-06	0.0029
Ra-226	5.380E-04	0.8500	7.124E-08	0.0001	3.088E-05	0.0488	9.000E-08	0.0001	1.102E-07	0.0002	5.234E-07	0.0008
Th-230	1.014E-07	0.0002	3.248E-07	0.0005	3.313E-07	0.0005	6.810E-10	0.0000	4.859E-11	0.0000	2.688E-07	0.0004
U-234	8.137E-09	0.0000	3.345E-08	0.0001	1.710E-07	0.0003	5.643E-10	0.0000	1.384E-09	0.0000	5.412E-08	0.0001
U-235	3.465E-06	0.0055	5.999E-09	0.0000	3.539E-08	0.0001	1.168E-10	0.0000	2.863E-10	0.0000	1.130E-08	0.0000
U-238	4.758E-06	0.0075	3.763E-08	0.0001	2.973E-07	0.0005	9.807E-10	0.0000	2.405E-09	0.0000	9.867E-08	0.0002
Total	5.468E-04	0.8639	5.572E-07	0.0009	8.233E-05	0.1301	2.667E-07	0.0004	1.989E-07	0.0003	2.806E-06	0.0044

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.955E-07	0.0003
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.171E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.307E-05	0.0838
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.697E-04	0.9000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.027E-06	0.0016
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.687E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.518E-06	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.195E-06	0.0082
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.330E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.695E-07	0.0003	2.288E-09	0.0000	0.000E+00	0.0000	4.365E-09	0.0000	8.470E-13	0.0000	1.177E-12	0.0000	1.483E-09	0.0000
Pb-210	7.543E-09	0.0000	2.229E-09	0.0000	0.000E+00	0.0000	1.379E-06	0.0022	4.715E-09	0.0000	2.297E-09	0.0000	5.054E-08	0.0001
Ra-226	4.897E-04	0.7737	1.386E-07	0.0002	0.000E+00	0.0000	7.392E-05	0.1168	2.397E-07	0.0004	1.769E-07	0.0003	2.150E-06	0.0034
Th-230	4.868E-05	0.0769	3.366E-07	0.0005	0.000E+00	0.0000	6.515E-06	0.0103	2.052E-08	0.0000	1.567E-08	0.0000	4.399E-07	0.0007
U-234	1.499E-08	0.0000	3.352E-08	0.0001	0.000E+00	0.0000	1.718E-07	0.0003	5.667E-10	0.0000	1.385E-09	0.0000	5.419E-08	0.0001
U-235	3.484E-06	0.0055	6.296E-09	0.0000	0.000E+00	0.0000	3.665E-08	0.0001	1.344E-10	0.0000	2.864E-10	0.0000	1.152E-08	0.0000
U-238	4.758E-06	0.0075	3.764E-08	0.0001	0.000E+00	0.0000	2.973E-07	0.0005	9.810E-10	0.0000	2.405E-09	0.0000	9.869E-08	0.0002
Total	5.468E-04	0.8639	5.572E-07	0.0009	0.000E+00	0.0000	8.233E-05	0.1301	2.667E-07	0.0004	1.989E-07	0.0003	2.806E-06	0.0044

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.777E-07	0.0003
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.446E-06	0.0023
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.663E-04	0.8947
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.601E-05	0.0885
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.765E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.539E-06	0.0056
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.195E-06	0.0082
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.330E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.105E-04	6.773E-02	2.415E-05	1.824E-05	1.290E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.067E-02
Pa-231	1.216E-04	2.967E-01	6.338E-03	8.242E-06	1.419E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.173E-01
Pb-210	2.127E-01	5.210E+02	1.794E+00	8.708E-01	2.483E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.485E+02
Ra-226	2.173E-01	2.121E+03	6.183E+00	7.571E+00	2.536E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.160E+03
Th-230	3.770E-01	9.210E+01	1.893E-01	1.351E-02	4.401E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.363E+02
U-234	8.808E-02	5.377E+01	1.774E-01	4.349E-01	1.028E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.466E+01
U-235	1.783E-02	1.088E+01	3.591E-02	8.804E-02	2.081E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.309E+01
U-238	1.208E-01	7.374E+01	2.433E-01	5.965E-01	1.410E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.868E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	5.377E-08	0.0001	7.257E-10	0.0000	1.389E-09	0.0000	4.949E-13	0.0000	3.742E-13	0.0000	4.703E-10	0.0000
Pa-231	5.650E-09	0.0000	1.734E-10	0.0000	2.102E-09	0.0000	4.490E-11	0.0000	5.839E-14	0.0000	1.664E-10	0.0000
Pb-210	2.944E-07	0.0004	8.699E-08	0.0001	5.401E-05	0.0802	1.860E-07	0.0003	9.027E-08	0.0001	1.973E-06	0.0029
Ra-226	5.736E-04	0.8522	7.594E-08	0.0001	3.292E-05	0.0489	9.595E-08	0.0001	1.175E-07	0.0002	5.579E-07	0.0008
Th-230	1.005E-07	0.0001	3.221E-07	0.0005	3.286E-07	0.0005	6.755E-10	0.0000	4.819E-11	0.0000	2.666E-07	0.0004
U-234	7.266E-09	0.0000	2.987E-08	0.0000	1.527E-07	0.0002	5.039E-10	0.0000	1.236E-09	0.0000	4.833E-08	0.0001
U-235	3.093E-06	0.0046	5.356E-09	0.0000	3.160E-08	0.0000	1.042E-10	0.0000	2.556E-10	0.0000	1.009E-08	0.0000
U-238	4.248E-06	0.0063	3.360E-08	0.0000	2.654E-07	0.0004	8.757E-10	0.0000	2.147E-09	0.0000	8.809E-08	0.0001
Total	5.814E-04	0.8637	5.548E-07	0.0008	8.771E-05	0.1303	2.842E-07	0.0004	2.114E-07	0.0003	2.944E-06	0.0044

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.636E-08	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.137E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.664E-05	0.0842
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.073E-04	0.9023
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.019E-06	0.0015
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.399E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.141E-06	0.0047
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.638E-06	0.0069
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.731E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.864E-10	0.0000	3.865E-12	0.0000	0.000E+00	0.0000	7.372E-12	0.0000	1.431E-15	0.0000	1.988E-15	0.0000	2.505E-12	0.0000
Pb-210	1.401E-11	0.0000	4.139E-12	0.0000	0.000E+00	0.0000	2.561E-09	0.0000	8.756E-12	0.0000	4.266E-12	0.0000	9.386E-11	0.0000
Ra-226	4.471E-04	0.6643	1.286E-07	0.0002	0.000E+00	0.0000	6.875E-05	0.1021	2.232E-07	0.0003	1.636E-07	0.0002	2.009E-06	0.0030
Th-230	1.268E-04	0.1884	3.562E-07	0.0005	0.000E+00	0.0000	1.850E-05	0.0275	5.943E-08	0.0001	4.421E-08	0.0001	7.877E-07	0.0012
U-234	5.485E-08	0.0001	3.007E-08	0.0000	0.000E+00	0.0000	1.592E-07	0.0002	5.246E-10	0.0000	1.250E-09	0.0000	4.864E-08	0.0001
U-235	3.153E-06	0.0047	6.252E-09	0.0000	0.000E+00	0.0000	3.508E-08	0.0001	1.496E-10	0.0000	2.560E-10	0.0000	1.073E-08	0.0000
U-238	4.248E-06	0.0063	3.363E-08	0.0000	0.000E+00	0.0000	2.656E-07	0.0004	8.763E-10	0.0000	2.148E-09	0.0000	8.815E-08	0.0001
Total	5.814E-04	0.8637	5.548E-07	0.0008	0.000E+00	0.0000	8.771E-05	0.1303	2.842E-07	0.0004	2.114E-07	0.0003	2.944E-06	0.0044

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.001E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.686E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.184E-04	0.7702
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.465E-04	0.2177
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.946E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.205E-06	0.0048
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.639E-06	0.0069
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.731E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	3.163E-04	1.722E-01	6.401E-05	5.093E-05	3.692E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.092E-01
Pa-231	3.242E-04	7.036E-01	1.583E-02	2.070E-05	3.785E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.573E-01
Pb-210	2.501E-01	5.446E+02	1.974E+00	9.641E-01	2.920E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.768E+02
Ra-226	2.544E-01	2.208E+03	6.562E+00	8.064E+00	2.970E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.253E+03
Th-230	3.662E-01	7.953E+01	1.815E-01	1.298E-02	4.276E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.225E+02
U-234	5.928E-02	3.217E+01	1.160E-01	2.857E-01	6.921E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.949E+01
U-235	1.199E-02	6.507E+00	2.347E-02	5.779E-02	1.400E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.988E+00
U-238	8.124E-02	4.409E+01	1.590E-01	3.916E-01	9.485E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.412E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	1.485E-07	0.0002	2.004E-09	0.0000	3.371E-09	0.0000	1.262E-12	0.0000	1.006E-12	0.0000	1.299E-09	0.0000
Pa-231	1.457E-08	0.0000	4.471E-10	0.0000	4.765E-09	0.0000	1.077E-10	0.0000	1.410E-13	0.0000	4.290E-10	0.0000
Pb-210	3.456E-07	0.0004	1.021E-07	0.0001	5.572E-05	0.0723	2.030E-07	0.0003	9.919E-08	0.0001	2.315E-06	0.0030
Ra-226	6.704E-04	0.8701	8.877E-08	0.0001	3.382E-05	0.0439	1.007E-07	0.0001	1.238E-07	0.0002	6.522E-07	0.0008
Th-230	9.766E-08	0.0001	3.129E-07	0.0004	2.806E-07	0.0004	6.467E-10	0.0000	4.625E-11	0.0000	2.589E-07	0.0003
U-234	4.891E-09	0.0000	2.010E-08	0.0000	9.036E-08	0.0001	3.288E-10	0.0000	8.099E-10	0.0000	3.253E-08	0.0000
U-235	2.080E-06	0.0027	3.602E-09	0.0000	1.868E-08	0.0000	6.796E-11	0.0000	1.674E-10	0.0000	6.787E-09	0.0000
U-238	2.857E-06	0.0037	2.260E-08	0.0000	1.569E-07	0.0002	5.709E-10	0.0000	1.406E-09	0.0000	5.925E-08	0.0001
Total	6.760E-04	0.8773	5.525E-07	0.0007	9.009E-05	0.1169	3.054E-07	0.0004	2.254E-07	0.0003	3.327E-06	0.0043

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.552E-07	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.032E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.878E-05	0.0763
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.052E-04	0.9153
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.508E-07	0.0012
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.490E-07	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.110E-06	0.0027
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.098E-06	0.0040
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.705E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	5.672E-20	0.0000	7.655E-22	0.0000	0.000E+00	0.0000	1.286E-21	0.0000	2.748E-25	0.0000	3.836E-25	0.0000	4.960E-22	0.0000
Pb-210	3.867E-21	0.0000	1.143E-21	0.0000	0.000E+00	0.0000	6.225E-19	0.0000	2.251E-21	0.0000	1.104E-21	0.0000	2.591E-20	0.0000
Ra-226	3.251E-04	0.4220	9.352E-08	0.0001	0.000E+00	0.0000	4.395E-05	0.0570	1.492E-07	0.0002	1.091E-07	0.0001	1.461E-06	0.0019
Th-230	3.453E-04	0.4482	4.096E-07	0.0005	0.000E+00	0.0000	4.582E-05	0.0595	1.550E-07	0.0002	1.138E-07	0.0001	1.763E-06	0.0023
U-234	3.918E-07	0.0005	2.074E-08	0.0000	0.000E+00	0.0000	1.407E-07	0.0002	4.985E-10	0.0000	9.328E-10	0.0000	3.455E-08	0.0000
U-235	2.244E-06	0.0029	6.054E-09	0.0000	0.000E+00	0.0000	2.681E-08	0.0000	1.770E-10	0.0000	1.686E-10	0.0000	8.515E-09	0.0000
U-238	2.858E-06	0.0037	2.268E-08	0.0000	0.000E+00	0.0000	1.573E-07	0.0002	5.724E-10	0.0000	1.410E-09	0.0000	5.938E-08	0.0001
Total	6.760E-04	0.8773	5.525E-07	0.0007	0.000E+00	0.0000	9.009E-05	0.1169	3.054E-07	0.0004	2.254E-07	0.0003	3.327E-06	0.0043

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.927E-20	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.568E-19	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.709E-04	0.4814
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.936E-04	0.5108
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.892E-07	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.285E-06	0.0030
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.099E-06	0.0040
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.705E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.035E-01	2.377E+02	4.614E-02	6.410E-02	4.547E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.833E+02
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	3.831E+00	3.520E+04	1.203E+02	5.864E+01	1.684E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.707E+04
Ra-226	6.261E+00	2.301E+05	6.707E+02	8.213E+02	2.751E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.343E+05
Ra-228	9.590E-03	3.524E+02	1.027E+00	1.258E+00	4.214E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.589E+02
Th-228	2.120E-02	1.949E+01	4.007E-02	2.859E-03	9.315E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.885E+01
Th-230	5.075E+00	4.667E+03	9.593E+00	6.844E-01	2.230E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.907E+03
Th-232	4.946E-02	4.548E+01	9.350E-02	6.670E-03	2.173E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.732E+01
U-234	2.151E+00	4.941E+03	1.630E+01	3.997E+01	9.450E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.943E+03
U-235	2.317E-01	5.323E+02	1.756E+00	4.306E+00	1.018E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.402E+02
U-238	9.393E-01	2.158E+03	7.120E+00	1.746E+01	4.127E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.595E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.879E-05	0.0012	4.177E-07	0.0000	2.998E-06	0.0001	5.824E-10	0.0000	8.085E-10	0.0000	1.019E-06	0.0000
Pa-231	3.016E-09	0.0000	9.981E-11	0.0000	4.547E-09	0.0000	9.664E-11	0.0000	1.277E-13	0.0000	3.605E-10	0.0000
Pb-210	5.927E-06	0.0002	1.899E-06	0.0001	4.442E-03	0.1846	1.533E-05	0.0006	7.431E-06	0.0003	1.621E-04	0.0067
Ra-226	1.542E-02	0.6410	2.176E-06	0.0001	3.550E-03	0.1476	1.035E-05	0.0004	1.267E-05	0.0005	6.016E-05	0.0025
Ra-228	5.078E-05	0.0021	6.075E-09	0.0000	6.199E-05	0.0026	1.774E-07	0.0000	2.191E-07	0.0000	1.169E-06	0.0000
Th-228	8.184E-05	0.0034	1.556E-07	0.0000	6.450E-07	0.0000	2.040E-09	0.0000	1.354E-10	0.0000	3.868E-07	0.0000
Th-230	1.249E-06	0.0001	4.337E-06	0.0002	1.665E-05	0.0007	3.423E-08	0.0000	2.442E-09	0.0000	1.351E-05	0.0006
Th-232	5.079E-09	0.0000	6.423E-08	0.0000	1.814E-07	0.0000	3.729E-10	0.0000	2.660E-11	0.0000	1.506E-07	0.0000
U-234	1.628E-07	0.0000	7.304E-07	0.0000	1.406E-05	0.0006	4.638E-08	0.0000	1.137E-07	0.0000	4.448E-06	0.0002
U-235	3.726E-05	0.0015	6.971E-08	0.0000	1.548E-06	0.0001	5.106E-09	0.0000	1.252E-08	0.0000	4.943E-07	0.0000
U-238	3.093E-05	0.0013	2.616E-07	0.0000	7.780E-06	0.0003	2.567E-08	0.0000	6.293E-08	0.0000	2.582E-06	0.0001
Total	1.566E-02	0.6508	1.012E-05	0.0004	8.097E-03	0.3366	2.597E-05	0.0011	2.051E-05	0.0009	2.460E-04	0.0102

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.322E-05	0.0014
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.120E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.634E-03	0.1926
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.905E-02	0.7921
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.143E-04	0.0048
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.303E-05	0.0035
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.578E-05	0.0015
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.017E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.956E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.939E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.164E-05	0.0017
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.406E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0 Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	2.878E-05	0.0012	4.175E-07	0.0000	0.000E+00	0.0000	2.997E-06	0.0001	5.817E-10	0.0000	8.082E-10	0.0000	1.018E-06	0.0000
Pb-210	3.155E-06	0.0001	1.011E-06	0.0000	0.000E+00	0.0000	2.354E-03	0.0978	8.046E-06	0.0003	3.921E-06	0.0002	8.626E-05	0.0036
Ra-226	1.534E-02	0.6377	3.049E-06	0.0001	0.000E+00	0.0000	5.611E-03	0.2333	1.755E-05	0.0007	1.610E-05	0.0007	1.354E-04	0.0056
Ra-228	9.126E-06	0.0004	1.132E-08	0.0000	0.000E+00	0.0000	4.197E-06	0.0002	1.224E-08	0.0000	1.483E-08	0.0000	1.050E-07	0.0000
Th-228	4.401E-06	0.0002	8.366E-09	0.0000	0.000E+00	0.0000	2.270E-08	0.0000	4.667E-11	0.0000	3.329E-12	0.0000	2.080E-08	0.0000
Th-230	8.220E-05	0.0034	4.351E-06	0.0002	0.000E+00	0.0000	4.312E-05	0.0018	1.157E-07	0.0000	8.180E-08	0.0000	1.411E-05	0.0006
Th-232	1.191E-04	0.0050	2.062E-07	0.0000	0.000E+00	0.0000	5.860E-05	0.0024	1.675E-07	0.0000	2.044E-07	0.0000	1.580E-06	0.0001
U-234	1.659E-07	0.0000	7.306E-07	0.0000	0.000E+00	0.0000	1.406E-05	0.0006	4.639E-08	0.0000	1.137E-07	0.0000	4.449E-06	0.0002
U-235	3.727E-05	0.0015	6.992E-08	0.0000	0.000E+00	0.0000	1.553E-06	0.0001	5.204E-09	0.0000	1.252E-08	0.0000	4.950E-07	0.0000
U-238	3.093E-05	0.0013	2.616E-07	0.0000	0.000E+00	0.0000	7.780E-06	0.0003	2.567E-08	0.0000	6.293E-08	0.0000	2.582E-06	0.0001
Total	1.566E-02	0.6508	1.012E-05	0.0004	0.000E+00	0.0000	8.097E-03	0.3366	2.597E-05	0.0011	2.051E-05	0.0009	2.460E-04	0.0102

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.321E-05	0.0014
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.456E-03	0.1021
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.112E-02	0.8781
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.347E-05	0.0006
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.453E-06	0.0002
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.440E-04	0.0060
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.799E-04	0.0075
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.957E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.941E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.164E-05	0.0017
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.406E-02	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.002E-01	2.303E+02	4.469E-02	6.209E-02	4.404E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.744E+02
Pa-231	4.900E-06	4.383E-02	8.601E-04	1.435E-06	2.153E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.684E-02
Pb-210	3.905E+00	3.607E+04	1.247E+02	6.040E+01	1.716E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.797E+04
Ra-226	6.260E+00	2.301E+05	6.706E+02	8.211E+02	2.751E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.343E+05
Ra-228	1.412E-02	5.113E+02	1.414E+00	1.774E+00	6.203E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.207E+02
Th-228	1.841E-02	2.330E+01	6.715E-02	4.546E-03	8.091E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.146E+01
Th-230	5.075E+00	4.667E+03	9.593E+00	6.843E-01	2.230E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.907E+03
Th-232	4.946E-02	4.548E+01	9.349E-02	6.670E-03	2.173E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.732E+01
U-234	2.150E+00	4.939E+03	1.630E+01	3.995E+01	9.446E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.940E+03
U-235	2.316E-01	5.321E+02	1.755E+00	4.304E+00	1.018E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.399E+02
U-238	9.389E-01	2.157E+03	7.117E+00	1.745E+01	4.125E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.594E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.788E-05	0.0012	4.046E-07	0.0000	2.904E-06	0.0001	5.641E-10	0.0000	7.831E-10	0.0000	9.866E-07	0.0000
Pa-231	3.216E-09	0.0000	1.064E-10	0.0000	4.850E-09	0.0000	1.031E-10	0.0000	1.361E-13	0.0000	3.845E-10	0.0000
Pb-210	5.987E-06	0.0002	1.918E-06	0.0001	4.487E-03	0.1861	1.549E-05	0.0006	7.506E-06	0.0003	1.637E-04	0.0068
Ra-226	1.542E-02	0.6396	2.175E-06	0.0001	3.549E-03	0.1472	1.035E-05	0.0004	1.267E-05	0.0005	6.016E-05	0.0025
Ra-228	5.238E-05	0.0022	6.266E-09	0.0000	6.395E-05	0.0027	1.831E-07	0.0000	2.260E-07	0.0000	1.206E-06	0.0001
Th-228	8.397E-05	0.0035	1.596E-07	0.0000	6.636E-07	0.0000	2.103E-09	0.0000	1.396E-10	0.0000	3.968E-07	0.0000
Th-230	1.249E-06	0.0001	4.337E-06	0.0002	1.665E-05	0.0007	3.423E-08	0.0000	2.442E-09	0.0000	1.351E-05	0.0006
Th-232	5.079E-09	0.0000	6.422E-08	0.0000	1.814E-07	0.0000	3.729E-10	0.0000	2.660E-11	0.0000	1.506E-07	0.0000
U-234	1.627E-07	0.0000	7.300E-07	0.0000	1.405E-05	0.0006	4.636E-08	0.0000	1.137E-07	0.0000	4.446E-06	0.0002
U-235	3.724E-05	0.0015	6.967E-08	0.0000	1.547E-06	0.0001	5.104E-09	0.0000	1.251E-08	0.0000	4.941E-07	0.0000
U-238	3.091E-05	0.0013	2.615E-07	0.0000	7.776E-06	0.0003	2.566E-08	0.0000	6.290E-08	0.0000	2.581E-06	0.0001
Total	1.566E-02	0.6495	1.013E-05	0.0004	8.144E-03	0.3378	2.613E-05	0.0011	2.059E-05	0.0009	2.476E-04	0.0103

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.218E-05	0.0013
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.661E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.681E-03	0.1942
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.905E-02	0.7904
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.180E-04	0.0049
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.519E-05	0.0035
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.578E-05	0.0015
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.017E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.955E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.937E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.162E-05	0.0017
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.411E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.788E-05	0.0012	4.044E-07	0.0000	0.000E+00	0.0000	2.903E-06	0.0001	5.635E-10	0.0000	7.829E-10	0.0000	9.863E-07	0.0000
Pb-210	3.057E-06	0.0001	9.793E-07	0.0000	0.000E+00	0.0000	2.281E-03	0.0946	7.798E-06	0.0003	3.800E-06	0.0002	8.359E-05	0.0035
Ra-226	1.533E-02	0.6361	3.098E-06	0.0001	0.000E+00	0.0000	5.726E-03	0.2376	1.795E-05	0.0007	1.629E-05	0.0007	1.396E-04	0.0058
Ra-228	8.657E-06	0.0004	1.111E-08	0.0000	0.000E+00	0.0000	3.724E-06	0.0002	1.086E-08	0.0000	1.315E-08	0.0000	9.578E-08	0.0000
Th-228	3.063E-06	0.0001	5.823E-09	0.0000	0.000E+00	0.0000	1.580E-08	0.0000	3.248E-11	0.0000	2.317E-12	0.0000	1.448E-08	0.0000
Th-230	8.758E-05	0.0036	4.352E-06	0.0002	0.000E+00	0.0000	4.511E-05	0.0019	1.219E-07	0.0000	8.748E-08	0.0000	1.415E-05	0.0006
Th-232	1.246E-04	0.0052	2.132E-07	0.0000	0.000E+00	0.0000	6.106E-05	0.0025	1.747E-07	0.0000	2.130E-07	0.0000	1.643E-06	0.0001
U-234	1.662E-07	0.0000	7.303E-07	0.0000	0.000E+00	0.0000	1.405E-05	0.0006	4.637E-08	0.0000	1.137E-07	0.0000	4.447E-06	0.0002
U-235	3.726E-05	0.0015	6.991E-08	0.0000	0.000E+00	0.0000	1.553E-06	0.0001	5.208E-09	0.0000	1.251E-08	0.0000	4.948E-07	0.0000
U-238	3.091E-05	0.0013	2.615E-07	0.0000	0.000E+00	0.0000	7.776E-06	0.0003	2.566E-08	0.0000	6.291E-08	0.0000	2.581E-06	0.0001
Total	1.566E-02	0.6495	1.013E-05	0.0004	0.000E+00	0.0000	8.144E-03	0.3378	2.613E-05	0.0011	2.059E-05	0.0009	2.476E-04	0.0103

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.217E-05	0.0013
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.380E-03	0.0987
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.124E-02	0.8810
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.251E-05	0.0005
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.099E-06	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.514E-04	0.0063
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.879E-04	0.0078
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.956E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.939E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.162E-05	0.0017
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.411E-02	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	9.403E-02	2.160E+02	4.193E-02	5.825E-02	4.132E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.575E+02
Pa-231	1.469E-05	1.338E-01	2.783E-03	3.933E-06	6.456E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.430E-01
Pb-210	4.044E+00	3.735E+04	1.291E+02	6.253E+01	1.777E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.932E+04
Ra-226	6.259E+00	2.300E+05	6.705E+02	8.210E+02	2.750E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.343E+05
Ra-228	2.169E-02	7.895E+02	2.225E+00	2.767E+00	9.530E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.040E+02
Th-228	1.846E-02	2.681E+01	8.584E-02	5.710E-03	8.112E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.502E+01
Th-230	5.074E+00	4.666E+03	9.592E+00	6.843E-01	2.230E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.906E+03
Th-232	4.946E-02	4.548E+01	9.349E-02	6.669E-03	2.173E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.731E+01
U-234	2.148E+00	4.935E+03	1.628E+01	3.992E+01	9.437E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.934E+03
U-235	2.313E-01	5.316E+02	1.754E+00	4.300E+00	1.017E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.393E+02
U-238	9.380E-01	2.155E+03	7.111E+00	1.743E+01	4.122E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.592E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	2.616E-05	0.0011	3.796E-07	0.0000	2.725E-06	0.0001	5.294E-10	0.0000	7.348E-10	0.0000	9.257E-07	0.0000
Pa-231	3.617E-09	0.0000	1.197E-10	0.0000	5.455E-09	0.0000	1.160E-10	0.0000	1.529E-13	0.0000	4.324E-10	0.0000
Pb-210	6.102E-06	0.0003	1.954E-06	0.0001	4.572E-03	0.1889	1.578E-05	0.0007	7.649E-06	0.0003	1.668E-04	0.0069
Ra-226	1.541E-02	0.6370	2.175E-06	0.0001	3.549E-03	0.1466	1.034E-05	0.0004	1.267E-05	0.0005	6.014E-05	0.0025
Ra-228	5.505E-05	0.0023	6.585E-09	0.0000	6.723E-05	0.0028	1.926E-07	0.0000	2.377E-07	0.0000	1.267E-06	0.0001
Th-228	8.851E-05	0.0037	1.683E-07	0.0000	6.988E-07	0.0000	2.214E-09	0.0000	1.470E-10	0.0000	4.183E-07	0.0000
Th-230	1.249E-06	0.0001	4.337E-06	0.0002	1.665E-05	0.0007	3.423E-08	0.0000	2.442E-09	0.0000	1.351E-05	0.0006
Th-232	5.079E-09	0.0000	6.422E-08	0.0000	1.814E-07	0.0000	3.729E-10	0.0000	2.660E-11	0.0000	1.505E-07	0.0000
U-234	1.625E-07	0.0000	7.293E-07	0.0000	1.404E-05	0.0006	4.632E-08	0.0000	1.136E-07	0.0000	4.442E-06	0.0002
U-235	3.721E-05	0.0015	6.961E-08	0.0000	1.546E-06	0.0001	5.099E-09	0.0000	1.250E-08	0.0000	4.936E-07	0.0000
U-238	3.088E-05	0.0013	2.613E-07	0.0000	7.769E-06	0.0003	2.563E-08	0.0000	6.284E-08	0.0000	2.579E-06	0.0001
Total	1.566E-02	0.6471	1.014E-05	0.0004	8.231E-03	0.3402	2.643E-05	0.0011	2.074E-05	0.0009	2.508E-04	0.0104

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.019E-05	0.0012
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.740E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.770E-03	0.1971
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.905E-02	0.7871
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.240E-04	0.0051
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.979E-05	0.0037
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.578E-05	0.0015
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.016E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.953E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.934E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.158E-05	0.0017
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.420E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years
0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent
0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years
0 Water Independent Pathways (Inhalation excludes radon)

0 Radio- Nuclide	Ground risk	fract.	Inhalation risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	2.615E-05	0.0011	3.794E-07	0.0000	0.000E+00	0.0000	2.724E-06	0.0001	5.286E-10	0.0000	7.345E-10	0.0000	9.254E-07	0.0000
Pb-210	2.871E-06	0.0001	9.197E-07	0.0000	0.000E+00	0.0000	2.142E-03	0.0885	7.323E-06	0.0003	3.568E-06	0.0001	7.851E-05	0.0032
Ra-226	1.532E-02	0.6331	3.192E-06	0.0001	0.000E+00	0.0000	5.946E-03	0.2457	1.870E-05	0.0008	1.665E-05	0.0007	1.477E-04	0.0061
Ra-228	7.428E-06	0.0003	9.922E-09	0.0000	0.000E+00	0.0000	2.929E-06	0.0001	8.541E-09	0.0000	1.033E-08	0.0000	7.821E-08	0.0000
Th-228	1.484E-06	0.0001	2.821E-09	0.0000	0.000E+00	0.0000	7.656E-09	0.0000	1.574E-11	0.0000	1.123E-12	0.0000	7.013E-09	0.0000
Th-230	9.834E-05	0.0041	4.354E-06	0.0002	0.000E+00	0.0000	4.920E-05	0.0020	1.348E-07	0.0000	9.904E-08	0.0000	1.425E-05	0.0006
Th-232	1.346E-04	0.0056	2.263E-07	0.0000	0.000E+00	0.0000	6.517E-05	0.0027	1.866E-07	0.0000	2.275E-07	0.0000	1.751E-06	0.0001
U-234	1.667E-07	0.0000	7.296E-07	0.0000	0.000E+00	0.0000	1.404E-05	0.0006	4.632E-08	0.0000	1.136E-07	0.0000	4.443E-06	0.0002
U-235	3.722E-05	0.0015	6.988E-08	0.0000	0.000E+00	0.0000	1.552E-06	0.0001	5.216E-09	0.0000	1.250E-08	0.0000	4.944E-07	0.0000
U-238	3.088E-05	0.0013	2.613E-07	0.0000	0.000E+00	0.0000	7.769E-06	0.0003	2.563E-08	0.0000	6.285E-08	0.0000	2.579E-06	0.0001
Total	1.566E-02	0.6471	1.014E-05	0.0004	0.000E+00	0.0000	8.231E-03	0.3402	2.643E-05	0.0011	2.074E-05	0.0009	2.508E-04	0.0104

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.018E-05	0.0012
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.236E-03	0.0924
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.145E-02	0.8865
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.046E-05	0.0004
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.502E-06	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.664E-04	0.0069
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.022E-04	0.0084
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.954E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.936E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.158E-05	0.0017
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.420E-02	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	7.521E-02	1.728E+02	3.356E-02	4.660E-02	3.305E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.059E+02
Pa-231	4.888E-05	4.480E-01	9.495E-03	1.265E-05	2.148E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.789E-01
Pb-210	4.469E+00	4.125E+04	1.425E+02	6.903E+01	1.964E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.343E+04
Ra-226	6.255E+00	2.299E+05	6.700E+02	8.204E+02	2.748E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.341E+05
Ra-228	3.751E-02	1.371E+03	3.920E+00	4.842E+00	1.648E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.396E+03
Th-228	3.240E-02	4.688E+01	1.511E-01	1.001E-02	1.424E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.127E+01
Th-230	5.073E+00	4.665E+03	9.590E+00	6.841E-01	2.229E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.905E+03
Th-232	4.945E-02	4.547E+01	9.347E-02	6.668E-03	2.173E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.730E+01
U-234	2.141E+00	4.918E+03	1.623E+01	3.979E+01	9.406E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.915E+03
U-235	2.306E-01	5.298E+02	1.748E+00	4.286E+00	1.013E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.372E+02
U-238	9.349E-01	2.148E+03	7.087E+00	1.738E+01	4.108E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.583E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.094E-05	0.0009	3.037E-07	0.0000	2.181E-06	0.0001	4.240E-10	0.0000	5.880E-10	0.0000	7.408E-07	0.0000
Pa-231	5.016E-09	0.0000	1.660E-10	0.0000	7.568E-09	0.0000	1.612E-10	0.0000	2.116E-13	0.0000	5.995E-10	0.0000
Pb-210	6.450E-06	0.0003	2.066E-06	0.0001	4.831E-03	0.1974	1.667E-05	0.0007	8.081E-06	0.0003	1.763E-04	0.0072
Ra-226	1.540E-02	0.6294	2.173E-06	0.0001	3.546E-03	0.1449	1.034E-05	0.0004	1.266E-05	0.0005	6.010E-05	0.0025
Ra-228	6.062E-05	0.0025	7.252E-09	0.0000	7.407E-05	0.0030	2.126E-07	0.0000	2.621E-07	0.0000	1.395E-06	0.0001
Th-228	1.009E-04	0.0041	1.917E-07	0.0000	7.872E-07	0.0000	2.478E-09	0.0000	1.645E-10	0.0000	4.766E-07	0.0000
Th-230	1.249E-06	0.0001	4.335E-06	0.0002	1.665E-05	0.0007	3.422E-08	0.0000	2.441E-09	0.0000	1.350E-05	0.0006
Th-232	5.078E-09	0.0000	6.421E-08	0.0000	1.814E-07	0.0000	3.728E-10	0.0000	2.659E-11	0.0000	1.505E-07	0.0000
U-234	1.620E-07	0.0000	7.270E-07	0.0000	1.399E-05	0.0006	4.617E-08	0.0000	1.132E-07	0.0000	4.427E-06	0.0002
U-235	3.709E-05	0.0015	6.938E-08	0.0000	1.541E-06	0.0001	5.083E-09	0.0000	1.246E-08	0.0000	4.920E-07	0.0000
U-238	3.078E-05	0.0013	2.604E-07	0.0000	7.744E-06	0.0003	2.555E-08	0.0000	6.264E-08	0.0000	2.570E-06	0.0001
Total	1.566E-02	0.6399	1.020E-05	0.0004	8.495E-03	0.3471	2.733E-05	0.0011	2.119E-05	0.0009	2.602E-04	0.0106

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.416E-05	0.0010
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.351E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.041E-03	0.2060
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.904E-02	0.7777
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-04	0.0056
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E-04	0.0042
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.577E-05	0.0015
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.016E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.947E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.921E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.145E-05	0.0017
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.448E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.092E-05	0.0009	3.035E-07	0.0000	0.000E+00	0.0000	2.179E-06	0.0001	4.228E-10	0.0000	5.875E-10	0.0000	7.402E-07	0.0000
Pb-210	2.305E-06	0.0001	7.384E-07	0.0000	0.000E+00	0.0000	1.720E-03	0.0703	5.879E-06	0.0002	2.865E-06	0.0001	6.302E-05	0.0026
Ra-226	1.527E-02	0.6240	3.475E-06	0.0001	0.000E+00	0.0000	6.610E-03	0.2701	2.097E-05	0.0009	1.773E-05	0.0007	1.723E-04	0.0070
Ra-228	3.547E-06	0.0001	4.938E-09	0.0000	0.000E+00	0.0000	1.261E-06	0.0001	3.676E-09	0.0000	4.443E-09	0.0000	3.530E-08	0.0000
Th-228	1.175E-07	0.0000	2.233E-10	0.0000	0.000E+00	0.0000	6.060E-10	0.0000	1.246E-12	0.0000	8.886E-14	0.0000	5.551E-10	0.0000
Th-230	1.359E-04	0.0056	4.361E-06	0.0002	0.000E+00	0.0000	6.465E-05	0.0026	1.836E-07	0.0000	1.413E-07	0.0000	1.465E-05	0.0006
Th-232	1.578E-04	0.0064	2.580E-07	0.0000	0.000E+00	0.0000	7.377E-05	0.0030	2.117E-07	0.0000	2.579E-07	0.0000	1.987E-06	0.0001
U-234	1.693E-07	0.0000	7.273E-07	0.0000	0.000E+00	0.0000	1.400E-05	0.0006	4.618E-08	0.0000	1.132E-07	0.0000	4.428E-06	0.0002
U-235	3.711E-05	0.0015	6.980E-08	0.0000	0.000E+00	0.0000	1.550E-06	0.0001	5.245E-09	0.0000	1.246E-08	0.0000	4.932E-07	0.0000
U-238	3.078E-05	0.0013	2.604E-07	0.0000	0.000E+00	0.0000	7.744E-06	0.0003	2.555E-08	0.0000	6.264E-08	0.0000	2.570E-06	0.0001
Total	1.566E-02	0.6399	1.020E-05	0.0004	0.000E+00	0.0000	8.495E-03	0.3471	2.733E-05	0.0011	2.119E-05	0.0009	2.602E-04	0.0106

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.414E-05	0.0010
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.795E-03	0.0733
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.210E-02	0.9028
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.857E-06	0.0002
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.188E-07	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.199E-04	0.0090
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.343E-04	0.0096
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.948E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.924E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.145E-05	0.0017
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.448E-02	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	3.978E-02	9.141E+01	1.779E-02	2.465E-02	1.748E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.089E+02
Pa-231	1.458E-04	1.339E+00	2.853E-02	3.739E-05	6.409E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.432E+00
Pb-210	5.271E+00	4.862E+04	1.676E+02	8.130E+01	2.316E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.118E+04
Ra-226	6.242E+00	2.294E+05	6.687E+02	8.188E+02	2.743E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.336E+05
Ra-228	4.835E-02	1.769E+03	5.082E+00	6.264E+00	2.125E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.802E+03
Th-228	4.782E-02	6.603E+01	2.069E-01	1.374E-02	2.101E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.726E+01
Th-230	5.070E+00	4.662E+03	9.583E+00	6.837E-01	2.228E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.900E+03
Th-232	4.942E-02	4.545E+01	9.342E-02	6.664E-03	2.172E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.726E+01
U-234	2.121E+00	4.873E+03	1.608E+01	3.942E+01	9.318E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.860E+03
U-235	2.284E-01	5.249E+02	1.732E+00	4.246E+00	1.004E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.313E+02
U-238	9.262E-01	2.128E+03	7.022E+00	1.722E+01	4.070E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.559E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.110E-05	0.0004	1.610E-07	0.0000	1.156E-06	0.0000	2.257E-10	0.0000	3.116E-10	0.0000	3.926E-07	0.0000
Pa-231	8.982E-09	0.0000	2.973E-10	0.0000	1.356E-08	0.0000	2.892E-10	0.0000	3.779E-13	0.0000	1.074E-09	0.0000
Pb-210	7.104E-06	0.0003	2.276E-06	0.0001	5.320E-03	0.2132	1.833E-05	0.0007	8.894E-06	0.0004	1.942E-04	0.0078
Ra-226	1.537E-02	0.6161	2.169E-06	0.0001	3.539E-03	0.1418	1.032E-05	0.0004	1.263E-05	0.0005	5.998E-05	0.0024
Ra-228	6.442E-05	0.0026	7.706E-09	0.0000	7.873E-05	0.0032	2.262E-07	0.0000	2.788E-07	0.0000	1.483E-06	0.0001
Th-228	1.105E-04	0.0044	2.101E-07	0.0000	8.538E-07	0.0000	2.670E-09	0.0000	1.774E-10	0.0000	5.223E-07	0.0000
Th-230	1.248E-06	0.0001	4.333E-06	0.0002	1.664E-05	0.0007	3.420E-08	0.0000	2.439E-09	0.0000	1.349E-05	0.0005
Th-232	5.075E-09	0.0000	6.417E-08	0.0000	1.813E-07	0.0000	3.726E-10	0.0000	2.658E-11	0.0000	1.504E-07	0.0000
U-234	1.605E-07	0.0000	7.202E-07	0.0000	1.386E-05	0.0006	4.574E-08	0.0000	1.121E-07	0.0000	4.386E-06	0.0002
U-235	3.674E-05	0.0015	6.874E-08	0.0000	1.526E-06	0.0001	5.035E-09	0.0000	1.235E-08	0.0000	4.875E-07	0.0000
U-238	3.050E-05	0.0012	2.580E-07	0.0000	7.672E-06	0.0003	2.531E-08	0.0000	6.206E-08	0.0000	2.546E-06	0.0001
Total	1.564E-02	0.6266	1.027E-05	0.0004	8.980E-03	0.3599	2.899E-05	0.0012	2.199E-05	0.0009	2.777E-04	0.0111

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.281E-05	0.0005
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.420E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.551E-03	0.2224
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.900E-02	0.7613
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.451E-04	0.0058
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.121E-04	0.0045
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.575E-05	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.013E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.929E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.884E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.106E-05	0.0016
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.495E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.105E-05	0.0004	1.603E-07	0.0000	0.000E+00	0.0000	1.151E-06	0.0000	2.234E-10	0.0000	3.104E-10	0.0000	3.910E-07	0.0000
Pb-210	1.231E-06	0.0000	3.942E-07	0.0000	0.000E+00	0.0000	9.182E-04	0.0368	3.139E-06	0.0001	1.529E-06	0.0001	3.365E-05	0.0013
Ra-226	1.514E-02	0.6066	3.998E-06	0.0002	0.000E+00	0.0000	7.842E-03	0.3142	2.520E-05	0.0010	1.972E-05	0.0008	2.180E-04	0.0087
Ra-228	3.252E-07	0.0000	4.564E-10	0.0000	0.000E+00	0.0000	1.132E-07	0.0000	3.298E-10	0.0000	3.985E-10	0.0000	3.200E-09	0.0000
Th-228	8.368E-11	0.0000	1.591E-13	0.0000	0.000E+00	0.0000	4.317E-13	0.0000	8.874E-16	0.0000	6.331E-17	0.0000	3.955E-13	0.0000
Th-230	2.426E-04	0.0097	4.385E-06	0.0002	0.000E+00	0.0000	1.158E-04	0.0046	3.472E-07	0.0000	2.735E-07	0.0000	1.602E-05	0.0006
Th-232	1.746E-04	0.0070	2.815E-07	0.0000	0.000E+00	0.0000	7.965E-05	0.0032	2.289E-07	0.0000	2.786E-07	0.0000	2.152E-06	0.0001
U-234	1.821E-07	0.0000	7.209E-07	0.0000	0.000E+00	0.0000	1.387E-05	0.0006	4.576E-08	0.0000	1.122E-07	0.0000	4.388E-06	0.0002
U-235	3.680E-05	0.0015	6.968E-08	0.0000	0.000E+00	0.0000	1.544E-06	0.0001	5.327E-09	0.0000	1.235E-08	0.0000	4.901E-07	0.0000
U-238	3.050E-05	0.0012	2.580E-07	0.0000	0.000E+00	0.0000	7.672E-06	0.0003	2.531E-08	0.0000	6.206E-08	0.0000	2.546E-06	0.0001
Total	1.564E-02	0.6266	1.027E-05	0.0004	0.000E+00	0.0000	8.980E-03	0.3599	2.899E-05	0.0012	2.199E-05	0.0009	2.777E-04	0.0111

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.275E-05	0.0005
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.581E-04	0.0384
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.325E-02	0.9316
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.428E-07	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.467E-11	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.794E-04	0.0152
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.572E-04	0.0103
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.932E-05	0.0008
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.892E-05	0.0016
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.106E-05	0.0016
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.495E-02	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	4.593E-03	1.056E+01	2.211E-03	2.847E-03	2.018E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.258E+01
Pa-231	4.769E-04	4.381E+00	9.353E-02	1.218E-04	2.096E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.684E+00
Pb-210	6.056E+00	5.584E+04	1.923E+02	9.332E+01	2.661E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.878E+04
Ra-226	6.199E+00	2.278E+05	6.641E+02	8.131E+02	2.724E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.320E+05
Ra-228	4.933E-02	1.805E+03	5.186E+00	6.392E+00	2.168E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.839E+03
Th-228	4.933E-02	6.786E+01	2.121E-01	1.410E-02	2.168E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.976E+01
Th-230	5.058E+00	4.651E+03	9.561E+00	6.821E-01	2.223E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.884E+03
Th-232	4.932E-02	4.536E+01	9.323E-02	6.651E-03	2.167E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.713E+01
U-234	2.052E+00	4.715E+03	1.556E+01	3.814E+01	9.018E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.671E+03
U-235	2.211E-01	5.080E+02	1.676E+00	4.110E+00	9.716E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.110E+02
U-238	8.965E-01	2.060E+03	6.796E+00	1.666E+01	3.939E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.477E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.359E-06	0.0001	1.971E-08	0.0000	1.416E-07	0.0000	3.112E-11	0.0000	3.817E-11	0.0000	4.807E-08	0.0000
Pa-231	2.253E-08	0.0000	7.455E-10	0.0000	3.402E-08	0.0000	7.262E-10	0.0000	9.457E-13	0.0000	2.693E-09	0.0000
Pb-210	7.732E-06	0.0003	2.477E-06	0.0001	5.788E-03	0.2288	1.994E-05	0.0008	9.674E-06	0.0004	2.114E-04	0.0084
Ra-226	1.527E-02	0.6035	2.154E-06	0.0001	3.515E-03	0.1389	1.024E-05	0.0004	1.254E-05	0.0005	5.957E-05	0.0024
Ra-228	6.467E-05	0.0026	7.736E-09	0.0000	7.904E-05	0.0031	2.271E-07	0.0000	2.799E-07	0.0000	1.488E-06	0.0001
Th-228	1.113E-04	0.0044	2.115E-07	0.0000	8.588E-07	0.0000	2.684E-09	0.0000	1.784E-10	0.0000	5.258E-07	0.0000
Th-230	1.245E-06	0.0000	4.322E-06	0.0002	1.660E-05	0.0007	3.412E-08	0.0000	2.434E-09	0.0000	1.346E-05	0.0005
Th-232	5.065E-09	0.0000	6.404E-08	0.0000	1.809E-07	0.0000	3.718E-10	0.0000	2.653E-11	0.0000	1.501E-07	0.0000
U-234	1.553E-07	0.0000	6.970E-07	0.0000	1.342E-05	0.0005	4.426E-08	0.0000	1.085E-07	0.0000	4.245E-06	0.0002
U-235	3.556E-05	0.0014	6.653E-08	0.0000	1.477E-06	0.0001	4.874E-09	0.0000	1.195E-08	0.0000	4.718E-07	0.0000
U-238	2.952E-05	0.0012	2.497E-07	0.0000	7.425E-06	0.0003	2.450E-08	0.0000	6.006E-08	0.0000	2.464E-06	0.0001
Total	1.552E-02	0.6134	1.027E-05	0.0004	9.422E-03	0.3724	3.052E-05	0.0012	2.268E-05	0.0009	2.938E-04	0.0116

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.568E-06	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.071E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.040E-03	0.2387
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.887E-02	0.7458
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.457E-04	0.0058
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.129E-04	0.0045
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.566E-05	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.005E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.866E-05	0.0007
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.760E-05	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.974E-05	0.0016
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.530E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.184E-06	0.0000	1.719E-08	0.0000	0.000E+00	0.0000	1.234E-07	0.0000	2.394E-11	0.0000	3.327E-11	0.0000	4.191E-08	0.0000
Pb-210	1.368E-07	0.0000	4.383E-08	0.0000	0.000E+00	0.0000	1.021E-04	0.0040	3.490E-07	0.0000	1.700E-07	0.0000	3.741E-06	0.0001
Ra-226	1.467E-02	0.5798	4.429E-06	0.0002	0.000E+00	0.0000	8.891E-03	0.3514	2.884E-05	0.0011	2.127E-05	0.0008	2.587E-04	0.0102
Ra-228	7.031E-11	0.0000	9.866E-14	0.0000	0.000E+00	0.0000	2.446E-11	0.0000	7.129E-14	0.0000	8.614E-14	0.0000	6.917E-13	0.0000
Th-228	8.075E-22	0.0000	1.535E-24	0.0000	0.000E+00	0.0000	4.166E-24	0.0000	8.555E-27	0.0000	6.057E-28	0.0000	3.816E-24	0.0000
Th-230	6.078E-04	0.0240	4.479E-06	0.0002	0.000E+00	0.0000	3.265E-04	0.0129	1.029E-06	0.0000	7.852E-07	0.0000	2.204E-05	0.0009
Th-232	1.759E-04	0.0070	2.833E-07	0.0000	0.000E+00	0.0000	8.008E-05	0.0032	2.301E-07	0.0000	2.801E-07	0.0000	2.164E-06	0.0001
U-234	2.884E-07	0.0000	6.987E-07	0.0000	0.000E+00	0.0000	1.348E-05	0.0005	4.446E-08	0.0000	1.087E-07	0.0000	4.251E-06	0.0002
U-235	3.576E-05	0.0014	6.980E-08	0.0000	0.000E+00	0.0000	1.529E-06	0.0001	5.607E-09	0.0000	1.196E-08	0.0000	4.806E-07	0.0000
U-238	2.952E-05	0.0012	2.498E-07	0.0000	0.000E+00	0.0000	7.427E-06	0.0003	2.450E-08	0.0000	6.008E-08	0.0000	2.465E-06	0.0001
Total	1.552E-02	0.6134	1.027E-05	0.0004	0.000E+00	0.0000	9.422E-03	0.3724	3.052E-05	0.0012	2.268E-05	0.0009	2.938E-04	0.0116

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.367E-06	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.065E-04	0.0042
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.387E-02	0.9436
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.572E-11	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.170E-22	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.626E-04	0.0380
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.590E-04	0.0102
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.887E-05	0.0007
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.786E-05	0.0015
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.974E-05	0.0016
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.530E-02	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	1.227E-03	2.831E+00	1.011E-03	7.625E-04	5.393E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.372E+00
Pa-231	1.355E-03	1.245E+01	2.659E-01	3.458E-04	5.955E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.331E+01
Pb-210	6.043E+00	5.571E+04	1.918E+02	9.310E+01	2.655E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.865E+04
Ra-226	6.082E+00	2.235E+05	6.515E+02	7.978E+02	2.673E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.276E+05
Ra-228	4.905E-02	1.795E+03	5.157E+00	6.356E+00	2.155E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.828E+03
Th-228	4.905E-02	6.748E+01	2.109E-01	1.402E-02	2.155E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.926E+01
Th-230	5.024E+00	4.620E+03	9.497E+00	6.775E-01	2.208E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.838E+03
Th-232	4.905E-02	4.510E+01	9.271E-02	6.614E-03	2.155E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.675E+01
U-234	1.869E+00	4.294E+03	1.417E+01	3.473E+01	8.212E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.164E+03
U-235	2.014E-01	4.628E+02	1.527E+00	3.743E+00	8.850E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.565E+02
U-238	8.166E-01	1.876E+03	6.190E+00	1.518E+01	3.588E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.256E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon Pathway	Radionuclides Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.565E-07	0.0000	8.074E-09	0.0000	5.818E-08	0.0000	2.075E-11	0.0000	1.567E-11	0.0000	1.969E-08	0.0000
Pa-231	5.845E-08	0.0000	1.934E-09	0.0000	8.827E-08	0.0000	1.885E-09	0.0000	2.452E-12	0.0000	6.986E-09	0.0000
Pb-210	7.669E-06	0.0003	2.456E-06	0.0001	5.741E-03	0.2307	1.977E-05	0.0008	9.595E-06	0.0004	2.097E-04	0.0084
Ra-226	1.498E-02	0.6020	2.114E-06	0.0001	3.449E-03	0.1386	1.005E-05	0.0004	1.231E-05	0.0005	5.845E-05	0.0023
Ra-228	6.431E-05	0.0026	7.693E-09	0.0000	7.859E-05	0.0032	2.258E-07	0.0000	2.783E-07	0.0000	1.480E-06	0.0001
Th-228	1.106E-04	0.0044	2.103E-07	0.0000	8.540E-07	0.0000	2.669E-09	0.0000	1.774E-10	0.0000	5.229E-07	0.0000
Th-230	1.237E-06	0.0000	4.293E-06	0.0002	1.648E-05	0.0007	3.389E-08	0.0000	2.417E-09	0.0000	1.337E-05	0.0005
Th-232	5.037E-09	0.0000	6.368E-08	0.0000	1.799E-07	0.0000	3.698E-10	0.0000	2.638E-11	0.0000	1.493E-07	0.0000
U-234	1.414E-07	0.0000	6.347E-07	0.0000	1.222E-05	0.0005	4.030E-08	0.0000	9.882E-08	0.0000	3.865E-06	0.0002
U-235	3.239E-05	0.0013	6.060E-08	0.0000	1.346E-06	0.0001	4.439E-09	0.0000	1.088E-08	0.0000	4.297E-07	0.0000
U-238	2.689E-05	0.0011	2.275E-07	0.0000	6.763E-06	0.0003	2.231E-08	0.0000	5.471E-08	0.0000	2.245E-06	0.0001
Total	1.522E-02	0.6118	1.008E-05	0.0004	9.306E-03	0.3740	3.015E-05	0.0012	2.235E-05	0.0009	2.902E-04	0.0117

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

	Water		Fish		Plant		Meat		Milk		All Pathways**	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.425E-07	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.575E-07	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.990E-03	0.2407
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.851E-02	0.7440
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.449E-04	0.0058
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.122E-04	0.0045
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.542E-05	0.0014
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.983E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.700E-05	0.0007
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.425E-05	0.0014
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.620E-05	0.0015
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.488E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.007E-09	0.0000	2.911E-11	0.0000	0.000E+00	0.0000	2.090E-10	0.0000	4.056E-14	0.0000	5.635E-14	0.0000	7.100E-11	0.0000
Pb-210	2.574E-10	0.0000	8.244E-11	0.0000	0.000E+00	0.0000	1.920E-07	0.0000	6.564E-10	0.0000	3.198E-10	0.0000	7.037E-09	0.0000
Ra-226	1.340E-02	0.5387	4.112E-06	0.0002	0.000E+00	0.0000	8.277E-03	0.3326	2.687E-05	0.0011	1.969E-05	0.0008	2.419E-04	0.0097
Ra-228	2.371E-21	0.0000	3.327E-24	0.0000	0.000E+00	0.0000	8.250E-22	0.0000	2.404E-24	0.0000	2.905E-24	0.0000	2.333E-23	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.585E-03	0.0637	4.746E-06	0.0002	0.000E+00	0.0000	9.282E-04	0.0373	2.982E-06	0.0001	2.218E-06	0.0001	3.952E-05	0.0016
Th-232	1.750E-04	0.0070	2.817E-07	0.0000	0.000E+00	0.0000	7.963E-05	0.0032	2.288E-07	0.0000	2.785E-07	0.0000	2.152E-06	0.0001
U-234	1.072E-06	0.0000	6.395E-07	0.0000	0.000E+00	0.0000	1.274E-05	0.0005	4.196E-08	0.0000	1.000E-07	0.0000	3.893E-06	0.0002
U-235	3.301E-05	0.0013	7.058E-08	0.0000	0.000E+00	0.0000	1.492E-06	0.0001	6.345E-09	0.0000	1.090E-08	0.0000	4.564E-07	0.0000
U-238	2.689E-05	0.0011	2.277E-07	0.0000	0.000E+00	0.0000	6.768E-06	0.0003	2.233E-08	0.0000	5.475E-08	0.0000	2.246E-06	0.0001
Total	1.522E-02	0.6118	1.008E-05	0.0004	0.000E+00	0.0000	9.306E-03	0.3740	3.015E-05	0.0012	2.235E-05	0.0009	2.902E-04	0.0117

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.316E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.004E-07	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.197E-02	0.8831
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.228E-21	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.562E-03	0.1030
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.575E-04	0.0103
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.848E-05	0.0007
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.504E-05	0.0014
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.621E-05	0.0015
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.488E-02	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	3.653E-03	8.423E+00	2.913E-03	2.269E-03	1.605E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.003E+01
Pa-231	3.749E-03	3.445E+01	7.360E-01	9.565E-04	1.648E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.683E+01
Pb-210	5.686E+00	5.242E+04	1.805E+02	8.760E+01	2.498E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.518E+04
Ra-226	5.725E+00	2.104E+05	6.133E+02	7.509E+02	2.516E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.143E+05
Ra-228	4.809E-02	1.760E+03	5.056E+00	6.232E+00	2.113E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.793E+03
Th-228	4.809E-02	6.616E+01	2.068E-01	1.374E-02	2.113E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.752E+01
Th-230	4.905E+00	4.510E+03	9.272E+00	6.614E-01	2.155E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.676E+03
Th-232	4.809E-02	4.422E+01	9.090E-02	6.485E-03	2.113E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.545E+01
U-234	1.347E+00	3.094E+03	1.021E+01	2.503E+01	5.917E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.721E+03
U-235	1.453E-01	3.338E+02	1.101E+00	2.700E+00	6.384E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.014E+02
U-238	5.890E-01	1.353E+03	4.465E+00	1.095E+01	2.588E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.628E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.597E-06	0.0001	2.317E-08	0.0000	1.669E-07	0.0000	5.771E-11	0.0000	4.496E-11	0.0000	5.650E-08	0.0000
Pa-231	1.563E-07	0.0000	5.174E-09	0.0000	2.361E-07	0.0000	5.045E-09	0.0000	6.556E-12	0.0000	1.869E-08	0.0000
Pb-210	7.218E-06	0.0003	2.312E-06	0.0001	5.403E-03	0.2307	1.861E-05	0.0008	9.030E-06	0.0004	1.973E-04	0.0084
Ra-226	1.410E-02	0.6023	1.990E-06	0.0001	3.247E-03	0.1386	9.463E-06	0.0004	1.159E-05	0.0005	5.503E-05	0.0023
Ra-228	6.305E-05	0.0027	7.543E-09	0.0000	7.706E-05	0.0033	2.214E-07	0.0000	2.729E-07	0.0000	1.451E-06	0.0001
Th-228	1.085E-04	0.0046	2.062E-07	0.0000	8.373E-07	0.0000	2.617E-09	0.0000	1.739E-10	0.0000	5.127E-07	0.0000
Th-230	1.208E-06	0.0001	4.192E-06	0.0002	1.609E-05	0.0007	3.308E-08	0.0000	2.360E-09	0.0000	1.305E-05	0.0006
Th-232	4.938E-09	0.0000	6.244E-08	0.0000	1.764E-07	0.0000	3.625E-10	0.0000	2.586E-11	0.0000	1.464E-07	0.0000
U-234	1.019E-07	0.0000	4.573E-07	0.0000	8.802E-06	0.0004	2.904E-08	0.0000	7.120E-08	0.0000	2.785E-06	0.0001
U-235	2.337E-05	0.0010	4.371E-08	0.0000	9.706E-07	0.0000	3.202E-09	0.0000	7.851E-09	0.0000	3.100E-07	0.0000
U-238	1.939E-05	0.0008	1.641E-07	0.0000	4.879E-06	0.0002	1.610E-08	0.0000	3.946E-08	0.0000	1.619E-06	0.0001
Total	1.433E-02	0.6118	9.463E-06	0.0004	8.759E-03	0.3740	2.838E-05	0.0012	2.101E-05	0.0009	2.723E-04	0.0116

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.844E-06	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.214E-07	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.637E-03	0.2407
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.743E-02	0.7442
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.421E-04	0.0061
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.100E-04	0.0047
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.458E-05	0.0015
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.905E-07	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.225E-05	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.470E-05	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.611E-05	0.0011
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.342E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.015E-19	0.0000	5.825E-21	0.0000	0.000E+00	0.0000	4.182E-20	0.0000	8.115E-24	0.0000	1.128E-23	0.0000	1.421E-20	0.0000
Pb-210	7.429E-20	0.0000	2.379E-20	0.0000	0.000E+00	0.0000	5.542E-17	0.0000	1.895E-19	0.0000	9.232E-20	0.0000	2.031E-18	0.0000
Ra-226	9.774E-03	0.4174	2.999E-06	0.0001	0.000E+00	0.0000	6.036E-03	0.2577	1.959E-05	0.0008	1.436E-05	0.0006	1.764E-04	0.0075
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	4.331E-03	0.1849	5.479E-06	0.0002	0.000E+00	0.0000	2.625E-03	0.1121	8.493E-06	0.0004	6.254E-06	0.0003	8.881E-05	0.0038
Th-232	1.715E-04	0.0073	2.762E-07	0.0000	0.000E+00	0.0000	7.807E-05	0.0033	2.244E-07	0.0000	2.731E-07	0.0000	2.110E-06	0.0001
U-234	7.856E-06	0.0003	4.721E-07	0.0000	0.000E+00	0.0000	1.343E-05	0.0006	4.397E-08	0.0000	8.217E-08	0.0000	2.955E-06	0.0001
U-235	2.512E-05	0.0011	7.206E-08	0.0000	0.000E+00	0.0000	1.374E-06	0.0001	8.305E-09	0.0000	7.903E-09	0.0000	3.852E-07	0.0000
U-238	1.940E-05	0.0008	1.647E-07	0.0000	0.000E+00	0.0000	4.892E-06	0.0002	1.614E-08	0.0000	3.956E-08	0.0000	1.623E-06	0.0001
Total	1.433E-02	0.6118	9.463E-06	0.0004	0.000E+00	0.0000	8.759E-03	0.3740	2.838E-05	0.0012	2.101E-05	0.0009	2.723E-04	0.0116

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.634E-19	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.783E-17	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.602E-02	0.6842
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.065E-03	0.3017
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.525E-04	0.0108
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.484E-05	0.0011
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.697E-05	0.0012
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.613E-05	0.0011
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.342E-02	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents

Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(1,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(2,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(1,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(2,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(1,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(2,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(1,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(2,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(1,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(2,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	6.529E-02	6.369E+02	3.375E+00	1.644E+00	4.721E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.891E+02
Ra-226	6.529E-02	2.547E+03	1.151E+01	1.409E+01	4.721E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.620E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	7.909E-08	0.0003	2.645E-08	0.0001	6.560E-05	0.2489	3.499E-07	0.0013	1.699E-07	0.0006	3.715E-06	0.0141
Ra-226	1.531E-04	0.5808	2.257E-08	0.0001	3.909E-05	0.1483	1.766E-07	0.0007	2.163E-07	0.0008	1.027E-06	0.0039
Total	1.531E-04	0.5811	4.901E-08	0.0002	1.047E-04	0.3972	5.265E-07	0.0020	3.861E-07	0.0015	4.742E-06	0.0180

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.994E-05	0.2654
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.936E-04	0.7346
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.635E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	5.150E-08	0.0002	1.722E-08	0.0001	0.000E+00	0.0000	4.259E-05	0.1616	2.256E-07	0.0009	1.099E-07	0.0004	2.419E-06	0.0092
Ra-226	1.531E-04	0.5809	3.179E-08	0.0001	0.000E+00	0.0000	6.210E-05	0.2357	3.009E-07	0.0011	2.762E-07	0.0010	2.323E-06	0.0088
Total	1.531E-04	0.5811	4.901E-08	0.0002	0.000E+00	0.0000	1.047E-04	0.3972	5.265E-07	0.0020	3.861E-07	0.0015	4.742E-06	0.0180

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.541E-05	0.1723
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.181E-04	0.8277
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.635E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	6.527E-02	6.388E+02	3.410E+00	1.655E+00	4.720E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.911E+02
Ra-226	6.526E-02	2.546E+03	1.150E+01	1.409E+01	4.719E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.619E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	7.906E-08	0.0003	2.644E-08	0.0001	6.559E-05	0.2490	3.501E-07	0.0013	1.699E-07	0.0006	3.713E-06	0.0141
Ra-226	1.530E-04	0.5808	2.256E-08	0.0001	3.907E-05	0.1483	1.765E-07	0.0007	2.162E-07	0.0008	1.026E-06	0.0039
Total	1.531E-04	0.5811	4.899E-08	0.0002	1.047E-04	0.3973	5.266E-07	0.0020	3.861E-07	0.0015	4.740E-06	0.0180

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.993E-05	0.2654
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.935E-04	0.7346
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.634E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	4.991E-08	0.0002	1.669E-08	0.0001	0.000E+00	0.0000	4.127E-05	0.1567	2.187E-07	0.0008	1.066E-07	0.0004	2.344E-06	0.0089
Ra-226	1.530E-04	0.5809	3.231E-08	0.0001	0.000E+00	0.0000	6.340E-05	0.2406	3.080E-07	0.0012	2.795E-07	0.0011	2.396E-06	0.0091
Total	1.531E-04	0.5811	4.899E-08	0.0002	0.000E+00	0.0000	1.047E-04	0.3973	5.266E-07	0.0020	3.861E-07	0.0015	4.740E-06	0.0180

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.401E-05	0.1670
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.194E-04	0.8330
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.634E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	6.523E-02	6.384E+02	3.408E+00	1.654E+00	4.717E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.907E+02
Ra-226	6.520E-02	2.544E+03	1.149E+01	1.407E+01	4.715E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.617E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	7.901E-08	0.0003	2.642E-08	0.0001	6.554E-05	0.2490	3.498E-07	0.0013	1.698E-07	0.0006	3.711E-06	0.0141
Ra-226	1.529E-04	0.5807	2.254E-08	0.0001	3.904E-05	0.1483	1.764E-07	0.0007	2.160E-07	0.0008	1.026E-06	0.0039
Total	1.529E-04	0.5810	4.896E-08	0.0002	1.046E-04	0.3973	5.262E-07	0.0020	3.858E-07	0.0015	4.736E-06	0.0180

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.988E-05	0.2655
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.933E-04	0.7345
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.632E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	4.687E-08	0.0002	1.567E-08	0.0001	0.000E+00	0.0000	3.876E-05	0.1472	2.054E-07	0.0008	1.001E-07	0.0004	2.202E-06	0.0084
Ra-226	1.529E-04	0.5809	3.328E-08	0.0001	0.000E+00	0.0000	6.583E-05	0.2501	3.209E-07	0.0012	2.857E-07	0.0011	2.535E-06	0.0096
Total	1.529E-04	0.5810	4.896E-08	0.0002	0.000E+00	0.0000	1.046E-04	0.3973	5.262E-07	0.0020	3.858E-07	0.0015	4.736E-06	0.0180

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.133E-05	0.1570
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.219E-04	0.8430
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.632E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	6.508E-02	6.370E+02	3.400E+00	1.650E+00	4.706E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.891E+02
Ra-226	6.500E-02	2.536E+03	1.146E+01	1.403E+01	4.700E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.608E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	7.880E-08	0.0003	2.635E-08	0.0001	6.538E-05	0.2491	3.489E-07	0.0013	1.694E-07	0.0006	3.701E-06	0.0141
Ra-226	1.524E-04	0.5806	2.247E-08	0.0001	3.892E-05	0.1483	1.758E-07	0.0007	2.153E-07	0.0008	1.022E-06	0.0039
Total	1.525E-04	0.5809	4.882E-08	0.0002	1.043E-04	0.3974	5.248E-07	0.0020	3.846E-07	0.0015	4.723E-06	0.0180

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.970E-05	0.2656
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.927E-04	0.7344
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.624E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	3.763E-08	0.0001	1.258E-08	0.0000	0.000E+00	0.0000	3.112E-05	0.1186	1.649E-07	0.0006	8.034E-08	0.0003	1.767E-06	0.0067
Ra-226	1.524E-04	0.5808	3.623E-08	0.0001	0.000E+00	0.0000	7.318E-05	0.2788	3.599E-07	0.0014	3.043E-07	0.0012	2.956E-06	0.0113
Total	1.525E-04	0.5809	4.882E-08	0.0002	0.000E+00	0.0000	1.043E-04	0.3974	5.248E-07	0.0020	3.846E-07	0.0015	4.723E-06	0.0180

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.318E-05	0.1264
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.293E-04	0.8736
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.624E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	6.461E-02	6.323E+02	3.375E+00	1.638E+00	4.672E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.840E+02
Ra-226	6.441E-02	2.513E+03	1.135E+01	1.390E+01	4.658E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.585E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	7.818E-08	0.0003	2.614E-08	0.0001	6.486E-05	0.2493	3.462E-07	0.0013	1.680E-07	0.0006	3.672E-06	0.0141
Ra-226	1.510E-04	0.5805	2.226E-08	0.0001	3.857E-05	0.1482	1.742E-07	0.0007	2.134E-07	0.0008	1.013E-06	0.0039
Total	1.511E-04	0.5808	4.841E-08	0.0002	1.034E-04	0.3976	5.204E-07	0.0020	3.814E-07	0.0015	4.685E-06	0.0180

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.915E-05	0.2658
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.910E-04	0.7342
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.602E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	2.009E-08	0.0001	6.718E-09	0.0000	0.000E+00	0.0000	1.661E-05	0.0639	8.802E-08	0.0003	4.289E-08	0.0002	9.436E-07	0.0036
Ra-226	1.511E-04	0.5807	4.169E-08	0.0002	0.000E+00	0.0000	8.681E-05	0.3337	4.324E-07	0.0017	3.385E-07	0.0013	3.742E-06	0.0144
Total	1.511E-04	0.5808	4.841E-08	0.0002	0.000E+00	0.0000	1.034E-04	0.3976	5.204E-07	0.0020	3.814E-07	0.0015	4.685E-06	0.0180

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.771E-05	0.0681
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.424E-04	0.9319
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.602E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon): Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways: Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	6.271E-02	6.137E+02	3.276E+00	1.590E+00	4.534E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.639E+02
Ra-226	6.241E-02	2.435E+03	1.100E+01	1.347E+01	4.513E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.505E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Pb-210	7.584E-08	0.0003	2.536E-08	0.0001	6.291E-05	0.2495	3.358E-07	0.0013	1.630E-07	0.0006	3.562E-06	0.0141
Ra-226	1.463E-04	0.5803	2.157E-08	0.0001	3.737E-05	0.1482	1.688E-07	0.0007	2.067E-07	0.0008	9.816E-07	0.0039
Total	1.464E-04	0.5806	4.693E-08	0.0002	1.003E-04	0.3977	5.046E-07	0.0020	3.697E-07	0.0015	4.543E-06	0.0180

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.708E-05	0.2660
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.851E-04	0.7340
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.521E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0

Radon Pathway	Radionuclides: Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Pb-210	2.234E-09	0.0000	7.469E-10	0.0000	0.000E+00	0.0000	1.847E-06	0.0073	9.786E-09	0.0000	4.769E-09	0.0000	1.049E-07	0.0004
Ra-226	1.464E-04	0.5806	4.618E-08	0.0002	0.000E+00	0.0000	9.844E-05	0.3904	4.948E-07	0.0020	3.649E-07	0.0014	4.439E-06	0.0176
Total	1.464E-04	0.5806	4.693E-08	0.0002	0.000E+00	0.0000	1.003E-04	0.3977	5.046E-07	0.0020	3.697E-07	0.0015	4.543E-06	0.0180

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.969E-06	0.0078
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.502E-04	0.9922
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.521E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Pb-210	5.731E-02	5.609E+02	2.994E+00	1.453E+00	4.144E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.068E+02
Ra-226	5.702E-02	2.225E+03	1.005E+01	1.231E+01	4.123E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.289E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	6.930E-08	0.0003	2.317E-08	0.0001	5.749E-05	0.2495	3.069E-07	0.0013	1.489E-07	0.0006	3.255E-06	0.0141
Ra-226	1.337E-04	0.5803	1.971E-08	0.0001	3.414E-05	0.1482	1.543E-07	0.0007	1.889E-07	0.0008	8.969E-07	0.0039
Total	1.338E-04	0.5806	4.288E-08	0.0002	9.164E-05	0.3977	4.611E-07	0.0020	3.378E-07	0.0015	4.152E-06	0.0180

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.130E-05	0.2661
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.691E-04	0.7339
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.304E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	4.201E-12	0.0000	1.405E-12	0.0000	0.000E+00	0.0000	3.474E-09	0.0000	1.841E-11	0.0000	8.969E-12	0.0000	1.973E-10	0.0000
Ra-226	1.338E-04	0.5806	4.288E-08	0.0002	0.000E+00	0.0000	9.163E-05	0.3977	4.611E-07	0.0020	3.378E-07	0.0015	4.152E-06	0.0180
Total	1.338E-04	0.5806	4.288E-08	0.0002	0.000E+00	0.0000	9.164E-05	0.3977	4.611E-07	0.0020	3.378E-07	0.0015	4.152E-06	0.0180

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.704E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.304E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.304E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon) Inhalation	Plant	Meat	Milk	Soil	Water Dependent Pathways Water	Fish	Plant	Meat	Milk	Total Ingestion*
Pb-210	4.179E-02	4.090E+02	2.183E+00	1.059E+00	3.022E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.425E+02
Ra-226	4.158E-02	1.622E+03	7.330E+00	8.975E+00	3.007E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.669E+03

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	5.053E-08	0.0003	1.690E-08	0.0001	4.192E-05	0.2495	2.238E-07	0.0013	1.086E-07	0.0006	2.373E-06	0.0141
Ra-226	9.749E-05	0.5803	1.437E-08	0.0001	2.490E-05	0.1482	1.125E-07	0.0007	1.377E-07	0.0008	6.540E-07	0.0039
Total	9.754E-05	0.5806	3.127E-08	0.0002	6.682E-05	0.3977	3.363E-07	0.0020	2.463E-07	0.0015	3.028E-06	0.0180

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.470E-05	0.2661
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.233E-04	0.7339
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.680E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	1.213E-21	0.0000	4.055E-22	0.0000	0.000E+00	0.0000	1.003E-18	0.0000	5.313E-21	0.0000	2.589E-21	0.0000	5.695E-20	0.0000
Ra-226	9.754E-05	0.5806	3.127E-08	0.0002	0.000E+00	0.0000	6.682E-05	0.3977	3.363E-07	0.0020	2.463E-07	0.0015	3.028E-06	0.0180
Total	9.754E-05	0.5806	3.127E-08	0.0002	0.000E+00	0.0000	6.682E-05	0.3977	3.363E-07	0.0020	2.463E-07	0.0015	3.028E-06	0.0180

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.069E-18	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.680E-04	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.680E-04	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Table of Contents
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Part III: Intake Quantities and Health Risk Factors
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Cancer Risk Slope Factors Summary Table
Risk Library: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF(1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF(2,1)
Sf-1	Pb-210+D	4.25E-09	4.25E-09	SLPF(3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF(4,1)
Sf-1	Ra-228+D	4.53E-06	4.53E-06	SLPF(5,1)
Sf-1	Th-228+D	7.76E-06	7.76E-06	SLPF(6,1)
Sf-1	Th-230	8.19E-10	8.19E-10	SLPF(7,1)
Sf-1	Th-232	3.42E-10	3.42E-10	SLPF(8,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF(9,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF(10,1)
Sf-1	U-238+D	1.14E-07	1.14E-07	SLPF(11,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Ac-227+D	2.09E-07	2.09E-07	SLPF(1,2)
Sf-2	Pa-231	4.55E-08	4.55E-08	SLPF(2,2)
Sf-2	Pb-210+D	1.36E-08	1.36E-08	SLPF(3,2)
Sf-2	Ra-226+D	1.16E-08	1.16E-08	SLPF(4,2)
Sf-2	Ra-228+D	5.23E-09	5.23E-09	SLPF(5,2)
Sf-2	Th-228+D	1.43E-07	1.43E-07	SLPF(6,2)
Sf-2	Th-230	2.85E-08	2.85E-08	SLPF(7,2)
Sf-2	Th-232	4.33E-08	4.33E-08	SLPF(8,2)
Sf-2	U-234	1.14E-08	1.14E-08	SLPF(9,2)
Sf-2	U-235+D	1.01E-08	1.01E-08	SLPF(10,2)
Sf-2	U-238+D	9.35E-09	9.35E-09	SLPF(11,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.53E-10	6.53E-10	SLPF(1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF(2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF(3,3)
Sf-3	Ra-226+D	5.15E-10	5.15E-10	SLPF(4,3)
Sf-3	Ra-228+D	1.46E-09	1.46E-09	SLPF(5,3)
Sf-3	Th-228+D	4.22E-10	4.22E-10	SLPF(6,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF(7,3)
Sf-3	Th-232	1.33E-10	1.33E-10	SLPF(8,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF(9,3)
Sf-3	U-235+D	9.76E-11	9.76E-11	SLPF(10,3)
Sf-3	U-238+D	1.21E-10	1.21E-10	SLPF(11,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.86E-10	4.86E-10	SLPF(1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF(2,4)
Sf-3	Pb-210+D	1.26E-09	1.26E-09	SLPF(3,4)
Sf-3	Ra-226+D	3.86E-10	3.86E-10	SLPF(4,4)
Sf-3	Ra-228+D	1.05E-09	1.05E-09	SLPF(5,4)
Sf-3	Th-228+D	3.00E-10	3.00E-10	SLPF(6,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF(7,4)
Sf-3	Th-232	1.01E-10	1.01E-10	SLPF(8,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF(9,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF(10,4)
Sf-3	U-238+D	8.71E-11	8.71E-11	SLPF(11,4)

Cancer Risk Slope Factors Summary Table (continued)
Risk Library: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	1.16E-09	1.16E-09	SLPF(1,5)
Sf-3	Pa-231	3.74E-10	3.74E-10	SLPF(2,5)
Sf-3	Pb-210+D	2.64E-09	2.64E-09	SLPF(3,5)
Sf-3	Ra-226+D	7.30E-10	7.30E-10	SLPF(4,5)
Sf-3	Ra-228+D	2.29E-09	2.29E-09	SLPF(5,5)
Sf-3	Th-228+D	8.09E-10	8.09E-10	SLPF(6,5)
Sf-3	Th-230	2.02E-10	2.02E-10	SLPF(7,5)
Sf-3	Th-232	2.31E-10	2.31E-10	SLPF(8,5)
Sf-3	U-234	1.58E-10	1.58E-10	SLPF(9,5)
Sf-3	U-235+D	1.63E-10	1.63E-10	SLPF(10,5)
Sf-3	U-238+D	2.10E-10	2.10E-10	SLPF(11,5)
Sf-Rn	Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn	Rn-222	1.80E-12	1.80E-12	SLPFRN(1,1)
Sf-Rn	Po-218	3.70E-12	3.70E-12	SLPFRN(1,2)
Sf-Rn	Pb-214	6.20E-12	6.20E-12	SLPFRN(1,3)
Sf-Rn	Bi-214	1.50E-11	1.50E-11	SLPFRN(1,4)
Sf-Rn	Rn-220	1.90E-13	1.90E-13	SLPFRN(2,1)
Sf-Rn	Po-216	3.00E-15	3.00E-15	SLPFRN(2,2)
Sf-Rn	Pb-212	3.90E-11	3.90E-11	SLPFRN(2,3)
Sf-Rn	Bi-212	3.70E-11	3.70E-11	SLPFRN(2,4)
Sf-Rn	Radon K factors, (mrem/WLM):			
Sf-Rn	Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR(1,1)
Sf-Rn	Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR(1,2)
Sf-Rn	Rn-220 Indoor	1.50E+02	1.50E+02	KFACTR(2,1)
Sf-Rn	Rn-220 Outdoor	2.50E+02	2.50E+02	KFACTR(2,2)

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	6.722E-01	1.936E+03	8.860E+00	4.452E+00	1.666E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.116E+03
Ra-226	6.722E-01	7.742E+03	2.537E+01	3.173E+01	1.666E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.966E+03
Ra-228	3.774E-03	4.346E+01	1.424E-01	1.781E-01	9.354E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.472E+01
Th-228	3.396E-02	9.793E+00	3.429E-02	2.470E-03	8.419E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.825E+01
Th-230	6.250E-01	1.802E+02	6.310E-01	4.545E-02	1.549E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.358E+02
Th-232	1.057E-01	3.047E+01	1.067E-01	7.684E-03	2.619E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.677E+01
U-234	3.939E-01	2.837E+02	1.494E+00	3.734E+00	9.763E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.865E+02
U-235	4.623E-02	3.329E+01	1.754E-01	4.382E-01	1.146E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.537E+01
U-238	2.349E-01	1.692E+02	8.913E-01	2.227E+00	5.823E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.305E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	1.656E-09	0.0000	2.308E-11	0.0000	5.122E-11	0.0000	5.587E-14	0.0000	2.283E-14	0.0000	3.175E-11	0.0000
Pa-231	6.188E-10	0.0000	1.967E-11	0.0000	2.741E-10	0.0000	7.918E-12	0.0000	1.083E-14	0.0000	4.007E-11	0.0000
Pb-210	8.793E-07	0.0004	2.705E-07	0.0001	1.946E-04	0.0817	9.041E-07	0.0004	4.533E-07	0.0002	1.302E-05	0.0055
Ra-226	1.715E-03	0.7198	2.336E-07	0.0001	1.173E-04	0.0492	3.862E-07	0.0002	4.833E-07	0.0002	3.644E-06	0.0015
Ra-228	1.062E-04	0.0446	1.226E-08	0.0000	3.837E-05	0.0161	1.242E-07	0.0001	1.569E-07	0.0001	1.330E-06	0.0006
Th-228	1.672E-04	0.0702	3.085E-07	0.0001	3.950E-07	0.0002	1.718E-09	0.0000	1.178E-10	0.0000	4.326E-07	0.0002
Th-230	1.605E-07	0.0001	5.336E-07	0.0002	6.309E-07	0.0003	2.246E-09	0.0000	1.618E-10	0.0000	9.374E-07	0.0004
Th-232	1.133E-08	0.0000	1.371E-07	0.0001	1.192E-07	0.0001	4.245E-10	0.0000	3.058E-11	0.0000	1.812E-07	0.0001
U-234	3.066E-08	0.0000	1.315E-07	0.0001	7.796E-07	0.0003	4.170E-09	0.0000	1.042E-08	0.0000	4.519E-07	0.0002
U-235	7.620E-06	0.0032	1.368E-08	0.0000	9.351E-08	0.0000	5.002E-10	0.0000	1.250E-09	0.0000	5.472E-08	0.0000
U-238	7.894E-06	0.0033	6.435E-08	0.0000	5.891E-07	0.0002	3.151E-09	0.0000	7.876E-09	0.0000	3.582E-07	0.0002
Total	2.005E-03	0.8415	1.705E-06	0.0007	3.528E-04	0.1481	1.427E-06	0.0006	1.113E-06	0.0005	2.041E-05	0.0086

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.762E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.606E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.101E-04	0.0882
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.837E-03	0.7710
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.462E-04	0.0614
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.684E-04	0.0707
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.265E-06	0.0010
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.493E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-06	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.784E-06	0.0033
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.917E-06	0.0037
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.382E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 0.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	5.712E-07	0.0002	1.757E-07	0.0001	0.000E+00	0.0000	1.263E-04	0.0530	5.833E-07	0.0002	2.934E-07	0.0001	8.460E-06	0.0036
Ra-226	1.705E-03	0.7156	3.265E-07	0.0001	0.000E+00	0.0000	1.845E-04	0.0775	7.033E-07	0.0003	6.396E-07	0.0003	8.166E-06	0.0034
Ra-228	3.705E-06	0.0016	4.452E-09	0.0000	0.000E+00	0.0000	5.128E-07	0.0002	1.690E-09	0.0000	2.087E-09	0.0000	2.330E-08	0.0000
Th-228	7.263E-06	0.0030	1.340E-08	0.0000	0.000E+00	0.0000	1.137E-08	0.0000	3.992E-11	0.0000	2.875E-12	0.0000	1.879E-08	0.0000
Th-230	1.048E-05	0.0044	5.353E-07	0.0002	0.000E+00	0.0000	1.625E-06	0.0007	5.930E-09	0.0000	3.732E-09	0.0000	9.790E-07	0.0004
Th-232	2.625E-04	0.1102	4.400E-07	0.0002	0.000E+00	0.0000	3.836E-05	0.0161	1.246E-07	0.0001	1.549E-07	0.0001	1.902E-06	0.0008
U-234	3.126E-08	0.0000	1.316E-07	0.0001	0.000E+00	0.0000	7.797E-07	0.0003	4.170E-09	0.0000	1.042E-08	0.0000	4.520E-07	0.0002
U-235	7.622E-06	0.0032	1.372E-08	0.0000	0.000E+00	0.0000	9.384E-08	0.0000	5.081E-10	0.0000	1.250E-09	0.0000	5.479E-08	0.0000
U-238	7.894E-06	0.0033	6.435E-08	0.0000	0.000E+00	0.0000	5.892E-07	0.0002	3.151E-09	0.0000	7.876E-09	0.0000	3.583E-07	0.0002
Total	2.005E-03	0.8415	1.705E-06	0.0007	0.000E+00	0.0000	3.528E-04	0.1481	1.427E-06	0.0006	1.113E-06	0.0005	2.041E-05	0.0086

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.364E-04	0.0573
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.899E-03	0.7972
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.250E-06	0.0018
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.306E-06	0.0031
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.363E-05	0.0057
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.034E-04	0.1274
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.409E-06	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.786E-06	0.0033
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.917E-06	0.0037
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.382E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.539E-08	1.337E-05	1.305E-07	5.267E-09	3.816E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.732E-05
Pa-231	9.772E-07	2.736E-03	7.307E-05	1.291E-07	2.422E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.052E-03
Pb-210	6.715E-01	1.938E+03	8.920E+00	4.468E+00	1.665E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.118E+03
Ra-226	6.721E-01	7.732E+03	2.535E+01	3.170E+01	1.666E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.956E+03
Ra-228	1.534E-02	1.715E+02	5.104E-01	6.712E-01	3.803E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.764E+02
Th-228	2.668E-02	9.818E+00	3.826E-02	2.703E-03	6.614E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.647E+01
Th-230	6.249E-01	1.800E+02	6.309E-01	4.544E-02	1.549E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.356E+02
Th-232	1.056E-01	3.043E+01	1.067E-01	7.682E-03	2.619E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.673E+01
U-234	3.932E-01	2.829E+02	1.492E+00	3.728E+00	9.748E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.856E+02
U-235	4.615E-02	3.321E+01	1.751E-01	4.375E-01	1.144E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.526E+01
U-238	2.345E-01	1.687E+02	8.898E-01	2.223E+00	5.814E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.300E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.813E-09	0.0000	2.527E-11	0.0000	5.603E-11	0.0000	6.002E-14	0.0000	2.500E-14	0.0000	3.477E-11	0.0000
Pa-231	6.597E-10	0.0000	2.097E-11	0.0000	2.920E-10	0.0000	8.440E-12	0.0000	1.153E-14	0.0000	4.272E-11	0.0000
Pb-210	8.787E-07	0.0004	2.703E-07	0.0001	1.942E-04	0.0812	9.031E-07	0.0004	4.528E-07	0.0002	1.301E-05	0.0054
Ra-226	1.715E-03	0.7165	2.336E-07	0.0001	1.171E-04	0.0490	3.858E-07	0.0002	4.828E-07	0.0002	3.644E-06	0.0015
Ra-228	1.104E-04	0.0461	1.275E-08	0.0000	3.987E-05	0.0167	1.292E-07	0.0001	1.631E-07	0.0001	1.383E-06	0.0006
Th-228	1.728E-04	0.0722	3.188E-07	0.0001	4.088E-07	0.0002	1.781E-09	0.0000	1.221E-10	0.0000	4.470E-07	0.0002
Th-230	1.605E-07	0.0001	5.335E-07	0.0002	6.301E-07	0.0003	2.246E-09	0.0000	1.618E-10	0.0000	9.374E-07	0.0004
Th-232	1.133E-08	0.0000	1.370E-07	0.0001	1.191E-07	0.0000	4.244E-10	0.0000	3.058E-11	0.0000	1.812E-07	0.0001
U-234	3.061E-08	0.0000	1.313E-07	0.0001	7.774E-07	0.0003	4.162E-09	0.0000	1.040E-08	0.0000	4.512E-07	0.0002
U-235	7.608E-06	0.0032	1.366E-08	0.0000	9.325E-08	0.0000	4.993E-10	0.0000	1.248E-09	0.0000	5.463E-08	0.0000
U-238	7.882E-06	0.0033	6.424E-08	0.0000	5.875E-07	0.0002	3.145E-09	0.0000	7.862E-09	0.0000	3.577E-07	0.0001
Total	2.014E-03	0.8418	1.715E-06	0.0007	3.538E-04	0.1479	1.430E-06	0.0006	1.119E-06	0.0005	2.047E-05	0.0086

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.929E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.024E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.097E-04	0.0876
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.837E-03	0.7675
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-04	0.0635
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-04	0.0727
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.264E-06	0.0009
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.491E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.405E-06	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.771E-06	0.0032
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.902E-06	0.0037
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.393E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	5.531E-07	0.0002	1.701E-07	0.0001	0.000E+00	0.0000	1.222E-04	0.0511	5.646E-07	0.0002	2.840E-07	0.0001	8.193E-06	0.0034
Ra-226	1.704E-03	0.7121	3.318E-07	0.0001	0.000E+00	0.0000	1.881E-04	0.0786	7.203E-07	0.0003	6.478E-07	0.0003	8.420E-06	0.0035
Ra-228	3.515E-06	0.0015	4.371E-09	0.0000	0.000E+00	0.0000	4.544E-07	0.0002	1.498E-09	0.0000	1.848E-09	0.0000	2.125E-08	0.0000
Th-228	5.055E-06	0.0021	9.327E-09	0.0000	0.000E+00	0.0000	7.902E-09	0.0000	2.778E-11	0.0000	2.001E-12	0.0000	1.308E-08	0.0000
Th-230	1.116E-05	0.0047	5.354E-07	0.0002	0.000E+00	0.0000	1.698E-06	0.0007	6.212E-09	0.0000	3.988E-09	0.0000	9.822E-07	0.0004
Th-232	2.746E-04	0.1148	4.549E-07	0.0002	0.000E+00	0.0000	3.993E-05	0.0167	1.298E-07	0.0001	1.614E-07	0.0001	1.977E-06	0.0008
U-234	3.127E-08	0.0000	1.314E-07	0.0001	0.000E+00	0.0000	7.775E-07	0.0003	4.163E-09	0.0000	1.040E-08	0.0000	4.513E-07	0.0002
U-235	7.611E-06	0.0032	1.370E-08	0.0000	0.000E+00	0.0000	9.360E-08	0.0000	5.078E-10	0.0000	1.248E-09	0.0000	5.471E-08	0.0000
U-238	7.882E-06	0.0033	6.425E-08	0.0000	0.000E+00	0.0000	5.875E-07	0.0002	3.146E-09	0.0000	7.863E-09	0.0000	3.577E-07	0.0001
Total	2.014E-03	0.8418	1.715E-06	0.0007	0.000E+00	0.0000	3.538E-04	0.1479	1.430E-06	0.0006	1.119E-06	0.0005	2.047E-05	0.0086

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.320E-04	0.0551
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.902E-03	0.7949
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.998E-06	0.0017
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.085E-06	0.0021
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.439E-05	0.0060
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.173E-04	0.1326
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.406E-06	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.774E-06	0.0032
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.902E-06	0.0037
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.393E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.355E-07	1.043E-04	4.365E-07	4.412E-08	3.358E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.383E-04
Pa-231	2.926E-06	8.323E-03	2.334E-04	3.438E-07	7.254E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.282E-03
Pb-210	6.702E-01	1.930E+03	8.894E+00	4.456E+00	1.661E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.109E+03
Ra-226	6.720E-01	7.712E+03	2.530E+01	3.164E+01	1.666E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.936E+03
Ra-228	3.468E-02	3.930E+02	1.238E+00	1.581E+00	8.598E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.044E+02
Th-228	2.661E-02	1.254E+01	5.445E-02	3.737E-03	6.597E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.920E+01
Th-230	6.248E-01	1.795E+02	6.307E-01	4.543E-02	1.549E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.351E+02
Th-232	1.056E-01	3.035E+01	1.066E-01	7.680E-03	2.618E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.665E+01
U-234	3.920E-01	2.814E+02	1.487E+00	3.715E+00	9.717E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.837E+02
U-235	4.601E-02	3.302E+01	1.745E-01	4.360E-01	1.140E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.504E+01
U-238	2.338E-01	1.678E+02	8.867E-01	2.215E+00	5.795E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.289E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Ac-227	2.153E-09	0.0000	3.001E-11	0.0000	6.637E-11	0.0000	6.855E-14	0.0000	2.967E-14	0.0000	4.129E-11	0.0000
Pa-231	7.412E-10	0.0000	2.355E-11	0.0000	3.275E-10	0.0000	9.481E-12	0.0000	1.293E-14	0.0000	4.799E-11	0.0000
Pb-210	8.775E-07	0.0004	2.699E-07	0.0001	1.935E-04	0.0802	9.010E-07	0.0004	4.518E-07	0.0002	1.300E-05	0.0054
Ra-226	1.715E-03	0.7104	2.335E-07	0.0001	1.168E-04	0.0484	3.850E-07	0.0002	4.819E-07	0.0002	3.643E-06	0.0015
Ra-228	1.174E-04	0.0487	1.356E-08	0.0000	4.235E-05	0.0175	1.374E-07	0.0001	1.734E-07	0.0001	1.472E-06	0.0006
Th-228	1.847E-04	0.0765	3.407E-07	0.0001	4.355E-07	0.0002	1.899E-09	0.0000	1.302E-10	0.0000	4.778E-07	0.0002
Th-230	1.605E-07	0.0001	5.334E-07	0.0002	6.284E-07	0.0003	2.245E-09	0.0000	1.618E-10	0.0000	9.372E-07	0.0004
Th-232	1.133E-08	0.0000	1.370E-07	0.0001	1.187E-07	0.0000	4.243E-10	0.0000	3.057E-11	0.0000	1.812E-07	0.0001
U-234	3.052E-08	0.0000	1.309E-07	0.0001	7.731E-07	0.0003	4.148E-09	0.0000	1.037E-08	0.0000	4.498E-07	0.0002
U-235	7.584E-06	0.0031	1.361E-08	0.0000	9.273E-08	0.0000	4.975E-10	0.0000	1.244E-09	0.0000	5.446E-08	0.0000
U-238	7.857E-06	0.0033	6.404E-08	0.0000	5.842E-07	0.0002	3.134E-09	0.0000	7.835E-09	0.0000	3.565E-07	0.0001
Total	2.033E-03	0.8425	1.737E-06	0.0007	3.553E-04	0.1472	1.436E-06	0.0006	1.127E-06	0.0005	2.057E-05	0.0085

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water risk	fract.	Fish risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	All Pathways** risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.291E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.150E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.090E-04	0.0866
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.836E-03	0.7608
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.616E-04	0.0670
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.860E-04	0.0771
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.262E-06	0.0009
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.487E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.399E-06	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.747E-06	0.0032
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.873E-06	0.0037
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.413E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+00 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground risk	fract.	Inhalation risk	fract.	Radon risk	fract.	Plant risk	fract.	Meat risk	fract.	Milk risk	fract.	Soil risk	fract.
Pb-210	5.188E-07	0.0002	1.596E-07	0.0001	0.000E+00	0.0000	1.143E-04	0.0474	5.290E-07	0.0002	2.661E-07	0.0001	7.683E-06	0.0032
Ra-226	1.702E-03	0.7055	3.417E-07	0.0001	0.000E+00	0.0000	1.948E-04	0.0807	7.525E-07	0.0003	6.633E-07	0.0003	8.905E-06	0.0037
Ra-228	3.015E-06	0.0012	3.902E-09	0.0000	0.000E+00	0.0000	3.566E-07	0.0001	1.176E-09	0.0000	1.450E-09	0.0000	1.735E-08	0.0000
Th-228	2.449E-06	0.0010	4.518E-09	0.0000	0.000E+00	0.0000	3.819E-09	0.0000	1.346E-11	0.0000	9.692E-13	0.0000	6.336E-09	0.0000
Th-230	1.253E-05	0.0052	5.356E-07	0.0002	0.000E+00	0.0000	1.847E-06	0.0008	6.798E-09	0.0000	4.508E-09	0.0000	9.890E-07	0.0004
Th-232	2.967E-04	0.1229	4.828E-07	0.0002	0.000E+00	0.0000	4.255E-05	0.0176	1.386E-07	0.0001	1.722E-07	0.0001	2.107E-06	0.0009
U-234	3.130E-08	0.0000	1.310E-07	0.0001	0.000E+00	0.0000	7.732E-07	0.0003	4.148E-09	0.0000	1.037E-08	0.0000	4.499E-07	0.0002
U-235	7.587E-06	0.0031	1.367E-08	0.0000	0.000E+00	0.0000	9.312E-08	0.0000	5.070E-10	0.0000	1.244E-09	0.0000	5.455E-08	0.0000
U-238	7.857E-06	0.0033	6.405E-08	0.0000	0.000E+00	0.0000	5.842E-07	0.0002	3.134E-09	0.0000	7.835E-09	0.0000	3.566E-07	0.0001
Total	2.033E-03	0.8425	1.737E-06	0.0007	0.000E+00	0.0000	3.553E-04	0.1472	1.436E-06	0.0006	1.127E-06	0.0005	2.057E-05	0.0085

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.235E-04	0.0512
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.908E-03	0.7906
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.396E-06	0.0014
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.463E-06	0.0010
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.592E-05	0.0066
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.421E-04	0.1418
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.400E-06	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.750E-06	0.0032
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.873E-06	0.0037
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.413E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.394E-06	1.016E-03	1.682E-06	4.444E-07	3.456E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.363E-03
Pa-231	9.692E-06	2.751E-02	7.872E-04	1.086E-06	2.403E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.070E-02
Pb-210	6.663E-01	1.902E+03	8.809E+00	4.415E+00	1.652E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.081E+03
Ra-226	6.715E-01	7.642E+03	2.512E+01	3.143E+01	1.665E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.865E+03
Ra-228	7.508E-02	8.494E+02	2.741E+00	3.462E+00	1.861E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.742E+02
Th-228	6.203E-02	2.826E+01	1.237E-01	8.457E-03	1.538E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.377E+01
Th-230	6.244E-01	1.779E+02	6.298E-01	4.537E-02	1.548E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.333E+02
Th-232	1.056E-01	3.008E+01	1.065E-01	7.671E-03	2.617E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.636E+01
U-234	3.877E-01	2.759E+02	1.468E+00	3.669E+00	9.609E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.771E+02
U-235	4.550E-02	3.238E+01	1.723E-01	4.307E-01	1.128E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.426E+01
U-238	2.312E-01	1.645E+02	8.757E-01	2.188E+00	5.731E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.249E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.578E-09	0.0000	4.986E-11	0.0000	1.093E-10	0.0000	1.004E-13	0.0000	4.921E-14	0.0000	6.859E-11	0.0000
Pa-231	1.024E-09	0.0000	3.254E-11	0.0000	4.494E-10	0.0000	1.308E-11	0.0000	1.776E-14	0.0000	6.631E-11	0.0000
Pb-210	8.740E-07	0.0004	2.688E-07	0.0001	1.910E-04	0.0776	8.940E-07	0.0004	4.485E-07	0.0002	1.294E-05	0.0053
Ra-226	1.714E-03	0.6963	2.334E-07	0.0001	1.158E-04	0.0470	3.823E-07	0.0002	4.787E-07	0.0002	3.641E-06	0.0015
Ra-228	1.322E-04	0.0537	1.526E-08	0.0000	4.733E-05	0.0192	1.541E-07	0.0001	1.944E-07	0.0001	1.656E-06	0.0007
Th-228	2.171E-04	0.0882	4.004E-07	0.0002	5.007E-07	0.0002	2.184E-09	0.0000	1.498E-10	0.0000	5.615E-07	0.0002
Th-230	1.604E-07	0.0001	5.330E-07	0.0002	6.226E-07	0.0003	2.242E-09	0.0000	1.616E-10	0.0000	9.365E-07	0.0004
Th-232	1.132E-08	0.0000	1.369E-07	0.0001	1.177E-07	0.0000	4.237E-10	0.0000	3.053E-11	0.0000	1.811E-07	0.0001
U-234	3.018E-08	0.0000	1.295E-07	0.0001	7.580E-07	0.0003	4.096E-09	0.0000	1.024E-08	0.0000	4.448E-07	0.0002
U-235	7.502E-06	0.0030	1.346E-08	0.0000	9.092E-08	0.0000	4.913E-10	0.0000	1.229E-09	0.0000	5.386E-08	0.0000
U-238	7.773E-06	0.0032	6.333E-08	0.0000	5.728E-07	0.0002	3.095E-09	0.0000	7.740E-09	0.0000	3.526E-07	0.0001
Total	2.079E-03	0.8448	1.794E-06	0.0007	3.568E-04	0.1450	1.443E-06	0.0006	1.141E-06	0.0005	2.077E-05	0.0084

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.806E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.586E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.065E-04	0.0839
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.834E-03	0.7452
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.815E-04	0.0737
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.186E-04	0.0888
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.255E-06	0.0009
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.474E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.377E-06	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.662E-06	0.0031
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.772E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.461E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	4.144E-07	0.0002	1.275E-07	0.0001	0.000E+00	0.0000	9.053E-05	0.0368	4.210E-07	0.0002	2.119E-07	0.0001	6.137E-06	0.0025
Ra-226	1.697E-03	0.6895	3.715E-07	0.0002	0.000E+00	0.0000	2.145E-04	0.0871	8.486E-07	0.0003	7.091E-07	0.0003	1.037E-05	0.0042
Ra-228	1.439E-06	0.0006	1.941E-09	0.0000	0.000E+00	0.0000	1.522E-07	0.0001	5.033E-10	0.0000	6.195E-10	0.0000	7.830E-09	0.0000
Th-228	1.938E-07	0.0001	3.574E-10	0.0000	0.000E+00	0.0000	2.995E-10	0.0000	1.064E-12	0.0000	7.664E-14	0.0000	5.013E-10	0.0000
Th-230	1.732E-05	0.0070	5.362E-07	0.0002	0.000E+00	0.0000	2.406E-06	0.0010	9.023E-09	0.0000	6.413E-09	0.0000	1.015E-06	0.0004
Th-232	3.477E-04	0.1412	5.503E-07	0.0002	0.000E+00	0.0000	4.780E-05	0.0194	1.563E-07	0.0001	1.940E-07	0.0001	2.390E-06	0.0010
U-234	3.155E-08	0.0000	1.295E-07	0.0001	0.000E+00	0.0000	7.582E-07	0.0003	4.097E-09	0.0000	1.024E-08	0.0000	4.449E-07	0.0002
U-235	7.507E-06	0.0030	1.355E-08	0.0000	0.000E+00	0.0000	9.148E-08	0.0000	5.045E-10	0.0000	1.229E-09	0.0000	5.399E-08	0.0000
U-238	7.773E-06	0.0032	6.334E-08	0.0000	0.000E+00	0.0000	5.728E-07	0.0002	3.096E-09	0.0000	7.740E-09	0.0000	3.526E-07	0.0001
Total	2.079E-03	0.8448	1.794E-06	0.0007	0.000E+00	0.0000	3.568E-04	0.1450	1.443E-06	0.0006	1.141E-06	0.0005	2.077E-05	0.0084

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.784E-05	0.0398
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.924E-03	0.7816
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.603E-06	0.0007
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.949E-07	0.0001
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.129E-05	0.0087
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.987E-04	0.1620
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.379E-06	0.0006
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.667E-06	0.0031
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.772E-06	0.0036
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.461E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	1.022E-05	7.164E-03	6.290E-06	3.227E-06	2.533E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.706E-03
Pa-231	2.856E-05	7.921E-02	2.309E-03	3.130E-06	7.079E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.860E-02
Pb-210	6.584E-01	1.834E+03	8.615E+00	4.323E+00	1.632E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.010E+03
Ra-226	6.703E-01	7.443E+03	2.462E+01	3.083E+01	1.662E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.665E+03
Ra-228	1.027E-01	1.135E+03	3.704E+00	4.671E+00	2.545E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.169E+03
Th-228	1.013E-01	4.231E+01	1.846E-01	1.267E-02	2.511E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.761E+01
Th-230	6.231E-01	1.732E+02	6.275E-01	4.522E-02	1.545E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.284E+02
Th-232	1.054E-01	2.929E+01	1.061E-01	7.646E-03	2.612E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.552E+01
U-234	3.755E-01	2.608E+02	1.417E+00	3.543E+00	9.309E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.588E+02
U-235	4.408E-02	3.061E+01	1.663E-01	4.159E-01	1.093E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.212E+01
U-238	2.240E-01	1.555E+02	8.451E-01	2.113E+00	5.552E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.140E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
  and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	9.092E-09	0.0000	1.266E-10	0.0000	2.705E-10	0.0000	2.030E-13	0.0000	1.244E-13	0.0000	1.742E-10	0.0000
Pa-231	1.814E-09	0.0000	5.760E-11	0.0000	7.774E-10	0.0000	2.296E-11	0.0000	3.105E-14	0.0000	1.174E-10	0.0000
Pb-210	8.668E-07	0.0003	2.666E-07	0.0001	1.848E-04	0.0743	8.773E-07	0.0004	4.407E-07	0.0002	1.284E-05	0.0052
Ra-226	1.712E-03	0.6883	2.330E-07	0.0001	1.127E-04	0.0453	3.746E-07	0.0002	4.695E-07	0.0002	3.634E-06	0.0015
Ra-228	1.422E-04	0.0572	1.640E-08	0.0000	4.966E-05	0.0200	1.629E-07	0.0001	2.056E-07	0.0001	1.780E-06	0.0007
Th-228	2.423E-04	0.0974	4.467E-07	0.0002	5.386E-07	0.0002	2.375E-09	0.0000	1.633E-10	0.0000	6.265E-07	0.0003
Th-230	1.601E-07	0.0001	5.320E-07	0.0002	6.060E-07	0.0002	2.234E-09	0.0000	1.610E-10	0.0000	9.347E-07	0.0004
Th-232	1.130E-08	0.0000	1.367E-07	0.0001	1.145E-07	0.0000	4.222E-10	0.0000	3.043E-11	0.0000	1.807E-07	0.0001
U-234	2.924E-08	0.0000	1.254E-07	0.0001	7.161E-07	0.0003	3.953E-09	0.0000	9.890E-09	0.0000	4.309E-07	0.0002
U-235	7.271E-06	0.0029	1.304E-08	0.0000	8.590E-08	0.0000	4.742E-10	0.0000	1.186E-09	0.0000	5.218E-08	0.0000
U-238	7.536E-06	0.0030	6.136E-08	0.0000	5.412E-07	0.0002	2.987E-09	0.0000	7.474E-09	0.0000	3.416E-07	0.0001
Total	2.112E-03	0.8492	1.831E-06	0.0007	3.497E-04	0.1406	1.427E-06	0.0006	1.135E-06	0.0005	2.082E-05	0.0084

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.663E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.789E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.001E-04	0.0804
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.829E-03	0.7355
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.940E-04	0.0780
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.439E-04	0.0981
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.235E-06	0.0009
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.437E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.316E-06	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.424E-06	0.0030
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.491E-06	0.0034
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.487E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+01 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	2.181E-07	0.0001	6.709E-08	0.0000	0.000E+00	0.0000	4.647E-05	0.0187	2.193E-07	0.0001	1.105E-07	0.0000	3.230E-06	0.0013
Ra-226	1.682E-03	0.6762	4.260E-07	0.0002	0.000E+00	0.0000	2.474E-04	0.0995	1.018E-06	0.0004	7.875E-07	0.0003	1.307E-05	0.0053
Ra-228	1.319E-07	0.0001	1.793E-10	0.0000	0.000E+00	0.0000	1.331E-08	0.0000	4.430E-11	0.0000	5.456E-11	0.0000	7.091E-10	0.0000
Th-228	1.379E-10	0.0000	2.543E-13	0.0000	0.000E+00	0.0000	2.079E-13	0.0000	7.556E-16	0.0000	5.445E-17	0.0000	3.566E-13	0.0000
Th-230	3.089E-05	0.0124	5.383E-07	0.0002	0.000E+00	0.0000	4.196E-06	0.0017	1.645E-08	0.0000	1.232E-08	0.0000	1.109E-06	0.0004
Th-232	3.844E-04	0.1545	5.996E-07	0.0002	0.000E+00	0.0000	5.030E-05	0.0202	1.657E-07	0.0001	2.057E-07	0.0001	2.586E-06	0.0010
U-234	3.326E-08	0.0000	1.255E-07	0.0001	0.000E+00	0.0000	7.166E-07	0.0003	3.955E-09	0.0000	9.891E-09	0.0000	4.311E-07	0.0002
U-235	7.282E-06	0.0029	1.323E-08	0.0000	0.000E+00	0.0000	8.695E-08	0.0000	4.973E-10	0.0000	1.187E-09	0.0000	5.247E-08	0.0000
U-238	7.536E-06	0.0030	6.137E-08	0.0000	0.000E+00	0.0000	5.412E-07	0.0002	2.988E-09	0.0000	7.475E-09	0.0000	3.416E-07	0.0001
Total	2.112E-03	0.8492	1.831E-06	0.0007	0.000E+00	0.0000	3.497E-04	0.1406	1.427E-06	0.0006	1.135E-06	0.0005	2.082E-05	0.0084

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.032E-05	0.0202
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.944E-03	0.7818
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.462E-07	0.0001
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.387E-10	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.677E-05	0.0148
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.382E-04	0.1762
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.320E-06	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.437E-06	0.0030
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.491E-06	0.0034
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.487E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	6.331E-05	4.032E-02	2.601E-05	1.972E-05	1.569E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.606E-02
Pa-231	8.940E-05	2.265E-01	6.979E-03	9.439E-06	2.216E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.557E-01
Pb-210	6.477E-01	1.647E+03	8.161E+00	4.115E+00	1.606E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.820E+03
Ra-226	6.660E-01	6.751E+03	2.288E+01	2.876E+01	1.651E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.968E+03
Ra-228	1.047E-01	1.057E+03	3.535E+00	4.475E+00	2.595E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.091E+03
Th-228	1.047E-01	3.974E+01	1.832E-01	1.264E-02	2.595E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.589E+01
Th-230	6.188E-01	1.571E+02	6.195E-01	4.469E-02	1.534E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.111E+02
Th-232	1.047E-01	2.656E+01	1.048E-01	7.558E-03	2.594E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.262E+01
U-234	3.360E-01	2.130E+02	1.251E+00	3.135E+00	8.330E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.007E+02
U-235	3.944E-02	2.501E+01	1.468E-01	3.680E-01	9.777E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.530E+01
U-238	2.004E-01	1.271E+02	7.461E-01	1.870E+00	4.969E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.794E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	3.408E-08	0.0000	4.732E-10	0.0000	9.212E-10	0.0000	5.905E-13	0.0000	4.594E-13	0.0000	6.510E-10	0.0000
Pa-231	4.367E-09	0.0000	1.384E-10	0.0000	1.705E-09	0.0000	5.322E-11	0.0000	7.202E-14	0.0000	2.820E-10	0.0000
Pb-210	8.558E-07	0.0004	2.632E-07	0.0001	1.662E-04	0.0680	8.338E-07	0.0003	4.208E-07	0.0002	1.267E-05	0.0052
Ra-226	1.704E-03	0.6970	2.315E-07	0.0001	1.020E-04	0.0417	3.477E-07	0.0001	4.376E-07	0.0002	3.611E-06	0.0015
Ra-228	1.426E-04	0.0583	1.640E-08	0.0000	4.527E-05	0.0185	1.523E-07	0.0001	1.930E-07	0.0001	1.780E-06	0.0007
Th-228	2.435E-04	0.0996	4.484E-07	0.0002	4.922E-07	0.0002	2.299E-09	0.0000	1.588E-10	0.0000	6.289E-07	0.0003
Th-230	1.591E-07	0.0001	5.283E-07	0.0002	5.485E-07	0.0002	2.205E-09	0.0000	1.591E-10	0.0000	9.282E-07	0.0004
Th-232	1.123E-08	0.0000	1.357E-07	0.0001	1.037E-07	0.0000	4.169E-10	0.0000	3.008E-11	0.0000	1.795E-07	0.0001
U-234	2.617E-08	0.0000	1.122E-07	0.0000	5.839E-07	0.0002	3.490E-09	0.0000	8.751E-09	0.0000	3.856E-07	0.0002
U-235	6.519E-06	0.0027	1.167E-08	0.0000	7.005E-08	0.0000	4.186E-10	0.0000	1.050E-09	0.0000	4.669E-08	0.0000
U-238	6.762E-06	0.0028	5.491E-08	0.0000	4.413E-07	0.0002	2.637E-09	0.0000	6.613E-09	0.0000	3.057E-07	0.0001
Total	2.105E-03	0.8607	1.803E-06	0.0007	3.158E-04	0.1291	1.345E-06	0.0006	1.068E-06	0.0004	2.054E-05	0.0084

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.613E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.546E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.813E-04	0.0741
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.811E-03	0.7406
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.900E-04	0.0777
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.450E-04	0.1002
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.166E-06	0.0009
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.306E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.120E-06	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.648E-06	0.0027
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.573E-06	0.0031
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.445E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	2.307E-08	0.0000	7.096E-09	0.0000	0.000E+00	0.0000	4.480E-06	0.0018	2.233E-08	0.0000	1.131E-08	0.0000	3.417E-07	0.0001
Ra-226	1.628E-03	0.6658	4.683E-07	0.0002	0.000E+00	0.0000	2.536E-04	0.1037	1.116E-06	0.0005	8.132E-07	0.0003	1.536E-05	0.0063
Ra-228	2.848E-11	0.0000	3.864E-14	0.0000	0.000E+00	0.0000	2.616E-12	0.0000	8.930E-15	0.0000	1.103E-14	0.0000	1.528E-13	0.0000
Th-228	1.326E-21	0.0000	2.442E-24	0.0000	0.000E+00	0.0000	1.823E-24	0.0000	7.204E-27	0.0000	5.148E-28	0.0000	3.425E-24	0.0000
Th-230	7.726E-05	0.0316	5.472E-07	0.0002	0.000E+00	0.0000	1.070E-05	0.0044	4.579E-08	0.0000	3.398E-08	0.0000	1.514E-06	0.0006
Th-232	3.861E-04	0.1579	6.006E-07	0.0002	0.000E+00	0.0000	4.587E-05	0.0188	1.551E-07	0.0001	1.932E-07	0.0001	2.589E-06	0.0011
U-234	5.033E-08	0.0000	1.125E-07	0.0000	0.000E+00	0.0000	5.870E-07	0.0002	3.502E-09	0.0000	8.759E-09	0.0000	3.862E-07	0.0002
U-235	6.557E-06	0.0027	1.228E-08	0.0000	0.000E+00	0.0000	7.268E-08	0.0000	4.724E-10	0.0000	1.050E-09	0.0000	4.762E-08	0.0000
U-238	6.762E-06	0.0028	5.493E-08	0.0000	0.000E+00	0.0000	4.414E-07	0.0002	2.638E-09	0.0000	6.615E-09	0.0000	3.058E-07	0.0001
Total	2.105E-03	0.8607	1.803E-06	0.0007	0.000E+00	0.0000	3.158E-04	0.1291	1.345E-06	0.0006	1.068E-06	0.0004	2.054E-05	0.0084

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.886E-06	0.0020
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.899E-03	0.7767
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.131E-11	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.334E-21	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.010E-05	0.0369
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.355E-04	0.1781
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.148E-06	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.691E-06	0.0027
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.574E-06	0.0031
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.445E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	2.051E-04	9.495E-02	7.043E-05	6.180E-05	5.085E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.459E-01
Pa-231	2.251E-04	4.149E-01	1.567E-02	2.147E-05	5.580E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.864E-01
Pb-210	6.351E-01	1.175E+03	7.122E+00	3.647E+00	1.574E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.343E+03
Ra-226	6.539E-01	4.820E+03	1.801E+01	2.298E+01	1.621E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.023E+03
Ra-228	1.027E-01	7.539E+02	2.784E+00	3.577E+00	2.546E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.857E+02
Th-228	1.027E-01	2.837E+01	1.617E-01	1.132E-02	2.546E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.400E+01
Th-230	6.065E-01	1.120E+02	5.968E-01	4.319E-02	1.503E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.630E+02
Th-232	1.027E-01	1.896E+01	1.010E-01	7.311E-03	2.545E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.452E+01
U-234	2.446E-01	1.128E+02	8.752E-01	2.208E+00	6.063E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.765E+02
U-235	2.872E-02	1.324E+01	1.027E-01	2.593E-01	7.119E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.073E+01
U-238	1.459E-01	6.730E+01	5.221E-01	1.318E+00	3.618E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.053E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.721E-08	0.0000	1.340E-09	0.0000	1.883E-09	0.0000	1.427E-12	0.0000	1.258E-12	0.0000	1.844E-09	0.0000
Pa-231	1.010E-08	0.0000	3.184E-10	0.0000	2.832E-09	0.0000	1.091E-10	0.0000	1.497E-13	0.0000	6.488E-10	0.0000
Pb-210	8.399E-07	0.0004	2.582E-07	0.0001	1.177E-04	0.0510	7.271E-07	0.0003	3.728E-07	0.0002	1.243E-05	0.0054
Ra-226	1.673E-03	0.7246	2.272E-07	0.0001	7.228E-05	0.0313	2.727E-07	0.0001	3.485E-07	0.0002	3.545E-06	0.0015
Ra-228	1.403E-04	0.0608	1.609E-08	0.0000	3.205E-05	0.0139	1.195E-07	0.0001	1.538E-07	0.0001	1.746E-06	0.0008
Th-228	2.377E-04	0.1029	4.399E-07	0.0002	3.486E-07	0.0002	2.027E-09	0.0000	1.420E-10	0.0000	6.169E-07	0.0003
Th-230	1.562E-07	0.0001	5.178E-07	0.0002	3.881E-07	0.0002	2.125E-09	0.0000	1.538E-10	0.0000	9.097E-07	0.0004
Th-232	1.102E-08	0.0000	1.332E-07	0.0001	7.344E-08	0.0000	4.020E-10	0.0000	2.910E-11	0.0000	1.761E-07	0.0001
U-234	1.906E-08	0.0000	8.170E-08	0.0000	3.068E-07	0.0001	2.441E-09	0.0000	6.163E-09	0.0000	2.807E-07	0.0001
U-235	4.768E-06	0.0021	8.498E-09	0.0000	3.682E-08	0.0000	2.929E-10	0.0000	7.395E-10	0.0000	3.400E-08	0.0000
U-238	4.945E-06	0.0021	3.998E-08	0.0000	2.319E-07	0.0001	1.845E-09	0.0000	4.659E-09	0.0000	2.226E-07	0.0001
Total	2.062E-03	0.8930	1.724E-06	0.0007	2.234E-04	0.0967	1.129E-06	0.0005	8.870E-07	0.0004	1.997E-05	0.0086

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E-07	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.401E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.323E-04	0.0573
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.750E-03	0.7578
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.744E-04	0.0755
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.391E-04	0.1035
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.974E-06	0.0009
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.942E-07	0.0002
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.969E-07	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.849E-06	0.0021
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.446E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.309E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 3.000E+02 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

0 Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	3.764E-11	0.0000	1.157E-11	0.0000	0.000E+00	0.0000	5.280E-09	0.0000	3.244E-11	0.0000	1.667E-11	0.0000	5.573E-10	0.0000
Ra-226	1.475E-03	0.6387	4.305E-07	0.0002	0.000E+00	0.0000	1.687E-04	0.0730	8.889E-07	0.0004	6.396E-07	0.0003	1.421E-05	0.0062
Ra-228	9.503E-22	0.0000	1.292E-24	0.0000	0.000E+00	0.0000	6.337E-23	0.0000	2.396E-25	0.0000	2.998E-25	0.0000	5.109E-24	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.992E-04	0.0863	5.719E-07	0.0002	0.000E+00	0.0000	2.165E-05	0.0094	1.129E-07	0.0000	8.175E-08	0.0000	2.669E-06	0.0012
Th-232	3.780E-04	0.1637	5.892E-07	0.0003	0.000E+00	0.0000	3.247E-05	0.0141	1.219E-07	0.0001	1.539E-07	0.0001	2.539E-06	0.0011
U-234	1.753E-07	0.0001	8.243E-08	0.0000	0.000E+00	0.0000	3.231E-07	0.0001	2.525E-09	0.0000	6.222E-09	0.0000	2.831E-07	0.0001
U-235	4.876E-06	0.0021	1.016E-08	0.0000	0.000E+00	0.0000	4.153E-08	0.0000	4.034E-10	0.0000	7.410E-10	0.0000	3.649E-08	0.0000
U-238	4.945E-06	0.0021	4.002E-08	0.0000	0.000E+00	0.0000	2.321E-07	0.0001	1.847E-09	0.0000	4.662E-09	0.0000	2.227E-07	0.0001
Total	2.062E-03	0.8930	1.724E-06	0.0007	0.000E+00	0.0000	2.234E-04	0.0967	1.129E-06	0.0005	8.870E-07	0.0004	1.997E-05	0.0086

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.936E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.660E-03	0.7187
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.021E-21	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.243E-04	0.0971
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.139E-04	0.1792
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.727E-07	0.0004
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.965E-06	0.0022
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.446E-06	0.0024
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.309E-03	1.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-226	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of
Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

0

Radon	Radionuclides							
Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All Pathways** risk	All Pathways** fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of
Radon and its Decay Products at t= 1.000E+03 years

0 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent   Water-dep. == Water-dependent

0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

0 Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground risk	Ground fract.	Inhalation risk	Inhalation fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	Soil risk	Soil fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water risk	Water fract.	Fish risk	Fish fract.	Radon risk	Radon fract.	Plant risk	Plant fract.	Meat risk	Meat fract.	Milk risk	Milk fract.	All pathways risk	All pathways fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides