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Environmental Impact Statement
for Department of Energy Activities in Support of Commercial Production of High-Assay Low-Enriched Uranium (HALEU)

VOLUME 2
Appendices

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APPENDIX A – ENVIRONMENTAL CONSEQUENCES SUPPORTING INFORMATION

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Acronyms, Abbreviations

<	less than
>	greater than
AADT	annual average daily traffic
ACP	American Centrifuge Plant
ANR	advanced nuclear reactor
BMPs	best management practices
BWXT	BWX Technologies, Inc.
CFR	Code of Federal Regulations
CISF	Consolidated Interim Storage Facility
CWA	Clean Water Act
dBA	A-weighted sound level
DOE	U.S. Department of Energy
DTS	dry transfer system
DU	depleted uranium
DUF_6	depleted uranium hexafluoride
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FFF	fuel fabrication facility
GEIS	Generic Environmental Impact Statement
GLE	Global Laser Enrichment
GNF-A	Global Nuclear Fuel – Americas
HALEU	high-assay low-enriched uranium
HF	hydrogen fluoride
IIFP	International Isotopes Fluorine Products, Inc.
IPaC	Information for Planning and Consultation
ISFSI	independent spent fuel storage installation
ISR	in-situ recovery
lbs	pounds
LEU	low-enriched uranium
LWR	light water reactor
MT	metric tons
MT/yr	metric ton per year
MWt	megawatts thermal
NEF	National Enrichment Facility
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
PPE	Plant Parameter Envelope
rem	roentgen equivalent man
ROI	region of influence
RWP	Regional Water Plan
SNF	spent nuclear fuel
SNM	special nuclear material
SPE	Site Parameter Envelope
SWU	separative work unit
TRISO	tri-structural isotropic
U-235	uranium-235
U_3O_8	triuranium oxide
UF_6	uranium hexafluoride
ULP	Uranium Leasing Program
UO_2	uranium dioxide
US-	U.S. Highway
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
UUSA	Urenco USA
X-energy	X-energy, LLC

Appendix A
Environmental Consequences Supporting Information

There are numerous existing National Environmental Policy Act (NEPA) evaluations for currently operating and planned uranium fuel cycle facilities. These existing evaluations identified and evaluated potential environmental consequences associated with the construction and operation of uranium fuel cycle facilities. The facilities and their associated construction and operation characteristics are very similar to the Proposed Action and post-Proposed Action activities addressed in this Environmental Impact Statement (EIS). Therefore, the potential environmental consequences are expected to be very similar. A list of the specific NEPA documents that were relevant to each of the activities is provided in this appendix in the respective activity sections. (Appendix B, *Facility NEPA Documentation*, provides a comprehensive list of the existing NEPA evaluations used to extrapolate the potential environmental consequences for the Proposed Action and post-Proposed Action activities.)

The author subject matter experts reviewed the applicable NEPA evaluations. Using the potential environmental consequences in those documents, they developed the potential environmental consequences for the Proposed Action and post-Proposed Action activities. The U.S. Department of Energy (DOE) used the same impact assessment categories (SMALL, MODERATE, and LARGE) from the majority of the source documents. In all cases, the Proposed Action and post-Proposed Action activities' potential environmental consequences for facilities located at existing uranium fuel cycle sites were assessed to be the same or less than those associated with the currently operating and planned uranium fuel cycle facilities' potential environmental consequences. Since there are no specific locations currently known for the Proposed Action or post-Proposed Action activities, those uncertainties are discussed where that uncertainty would be important to the potential environmental consequences. DOE determined potential environmental consequences for the following Proposed Action and post-Proposed Action activities:

<u>Proposed Action Activities</u>

- Uranium Mining and Milling
- Uranium Conversion
- Uranium Enrichment
- Uranium Deconversion
- Uranium Storage
- Radioactive Materials Transportation

<u>Post-Proposed Action Activities</u>

- Reactor Fuel Fabrication
- Construction and Operation of Reactors
- Spent Fuel Storage and Disposition

This EIS adopts the NRC impact assessment categories from most of the NEPA documents that were used as the basis for the impact analysis:

- **SMALL –** The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- **MODERATE** – The environmental effects are sufficient to alter noticeably, but not destabilize, important attributes of the resource.
- **LARGE** – The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

As discussed above, the potential environmental consequences associated with construction and operation of uranium fuel cycle facilities in the existing NEPA evaluations were evaluated by the authors of this EIS. The authors, who are subject matter experts in their respective fields, used their education, working knowledge, experience, and professional judgement to extrapolate the potential environmental consequences associated with the Proposed Action and post-Proposed Action activities that are discussed in this appendix. For additional discussions of the potential environmental consequences, please also see the *Technical Report in Support of the HALEU EIS* (Leidos, 2023). The Technical Report, and other project citations, are available to review through the project website.

This appendix provides a discussion of the potential environmental consequences for the resource areas potentially affected by the implementation of the Proposed Action and post-Proposed Action activities. Environmental consequences are discussed for Proposed Action and related post-Proposed Action activities if conducted at existing (or proposed new) facilities and for which existing NEPA documentation exists. Extrapolation of impacts, including those for existing brownfield and greenfield sites, are addressed in Chapter 3, *Affected Environment and Environmental Consequences,* of the EIS.

Use of the available NEPA documentation for licensed fuel cycle facilities in no way is intended to indicate a preference for the use of these facilities in commercializing the HALEU fuel cycle. They provide information on the kind and significance of impacts that could be incurred through the use of any existing or new facility.

A.1 Uranium Mining and Milling

A.1.1 Introduction

This EIS considers two main uranium extraction methods: in-situ recovery (ISR) mining (i.e., the predominant extraction method used in the United States for uranium recovery) and conventional mining, which includes open-pit and underground mining. Conventional mining would include transportation of the mined material to a uranium mill for extraction of uranium from the ore.

ISR facilities recover uranium from low-grade ores where other mining and milling methods may be too expensive or environmentally disruptive. In the ISR uranium extraction process, wells are drilled into rock formations. Water containing various compounds is injected into the uranium ore body, oxidizing the insoluble tetravalent uranium to highly soluble hexavalent uranium underground before being pumped to the surface for further processing.

Either of these methods might be utilized by commercial entities and therefore both are addressed.

A.1.2 Analysis Methodology

A.1.2.1 Approach to NEPA Analyses

This EIS incorporates by reference resource conditions and impact considerations of the primary existing NEPA documentation sources discussed in Section A.1.2.2, *Existing NEPA Documentation,* below, as well as other available information such as new census data. The analysis also considers comments provided by interested parties during the scoping period. Details regarding the impacts of construction, operation, and closure of uranium mining and recovery facilities to support high-assay low-enriched uranium (HALEU) production were developed from the range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.1.2.2.

Existing permitted ISR mining occurs primarily in the following locations:

- Northwest Nebraska (Dawes County)
- Northwest New Mexico (McKinley County)
- Southwest South Dakota (Fall River and Custer Counties)
- South Texas (Karnes, Bee, Goliad, Brooks, and Duval Counties)
- Eastern Wyoming (Campbell, Crook, and Johnson Counties)

- Southwestern Wyoming (Sweetwater County)

Existing permitted conventional mining occurs primarily in the following locations:

- Northwest Arizona (Mojave and Coconino Counties)
- Northwest New Mexico (McKinley and Cibola Counties)
- Southwest Colorado (Montrose and San Miguel Counties)
- Southeast Utah (San Juan and Garfield Counties)

Milling facilities used to process conventionally mined uranium are located in South-Central Utah (Garfield and San Juan Counties) and Southwestern Wyoming (Sweetwater County). White Mesa in Garfield County, Utah, is the only mill currently in operation.

The intent of this HALEU EIS is to provide a summary of potential impacts that could occur at new or existing permitted mines and mills, using existing NEPA documentation for existing operations and other available sources, incorporated by reference. Private industry, along with U.S. Nuclear Regulatory Commission (NRC) approvals, would determine the actual mining techniques employed and site-specific NEPA evaluation would be required for changes to existing permitted mining operations.

NEPA documentation for both ISR and conventional mining and milling is available as the mines and mills have been utilized for uranium recovery as part of the low-enriched uranium (LEU) fuel cycle. The function and operation of these facilities is identical in both the LEU and proposed HALEU fuel cycle. Ore is extracted and processed to produce the same yellowcake needed as feed material for the conversion facility. The only difference is the quantity of ore and yellowcake required to produce equivalent quantities of LEU and HALEU (roughly four times more for HALEU than LEU enriched to about 5%). In this analysis, that difference is addressed by the number of mines necessary to supply the uranium ore.

A.1.2.2 Existing NEPA Documentation

DOE prepared this HALEU EIS and determined the scope for ISR mining and milling activities by reviewing the *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (NUREG-1910) (NRC, 2009a) (referred to as the "ISR GEIS"). The NRC prepared the ISR GEIS to access the potential environmental impacts associated with the construction, operation, aquifer restoration, and decommissioning of ISR uranium recovery facilities. The NRC developed the ISR GEIS using (1) knowledge gained during the past 30 years licensing and regulating ISR facilities, (2) the active participation of the State of Wyoming Department of Environmental Quality as a cooperating agency, and (3) public comments received during the preparation of the ISR GEIS. The NRC's licensing experience indicates that the technology used for ISR uranium recovery is relatively standardized throughout the industry and therefore appropriate for a programmatic evaluation in a Generic Environmental Impact Statement (GEIS). The ISR GEIS determined which impacts would be essentially the same for all ISR facilities and which impacts would result in varying levels of impacts for different facilities, thus requiring further site-specific information to determine the potential impacts. As such, the ISR GEIS provides DOE with a starting point for determining the region of influence (ROI) and scope for resources under consideration for detailed analysis within this HALEU EIS. This HALEU EIS incorporates by reference information and analysis contained in the 2009 ISR GEIS and focuses on new information related to regulatory changes or changes to environmental conditions since publication of the 2009 ISR GEIS. The ISR process includes on-site processing to yellowcake.

DOE also reviewed the *Final Uranium Leasing Program Programmatic Environmental Impact Statement* (DOE/EIS-0472) (referred to as the "ULP PEIS") to determine the scope for conventional mining activities, which considers environmental impacts from conventional (underground) mine development in western Colorado (Mesa, Montrose, and San Miguel Counties) (DOE, 2014). DOE prepared the ULP PEIS to support the implementation of the Atomic Energy Act, which authorized and directed DOE, among other things, to the extent that DOE deems it necessary to implement the provisions of the Atomic Energy Act (42 United States Code [U.S.C.] 2097). The Uranium Leasing Program (ULP) contributes to the development of a supply of domestic uranium consistent with the provisions of the Atomic Energy Act and Energy Policy Action of 2005, which has commitments to decrease the United States' dependence on foreign energy supplies. DOE is using the ULP PEIS as a reference to gauge the type and magnitude of impacts and mitigations that could be expected if the Proposed Action and post-Proposed Action activities were to be supported through conventional mining on private lands.

Regarding milling of conventionally mined uranium, DOE reviewed the *Environmental Assessment for Renewal of Source Material License No. SUA-1358 for the White Mesa Uranium Mill in San Juan County, Utah*, because that facility is currently used for milling conventionally mined uranium from Colorado (NRC, 1997a).

Additionally, DOE also reviewed the following site-specific NEPA analyses for conventional mines and ISR facilities for resource conditions and impact considerations:

- *Draft Environmental Impact Statement for the La Jara Mesa Mine Project* (USDA, 2012)
- *Draft Environmental Impact Statement for Roca Honda Mine Sections 9, 10 and 16, Township 13 North, Range 8 West, New Mexico Principal Meridian, Cibola National Forest, McKinley and Cibola Counties, New Mexico* (USDA, 2013)
- *Environmental Impact Statement for the Moore Ranch ISR Project In Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 1* (NRC, 2010)
- *Environmental Impact Statement for the Nichols Ranch ISR Project in Campbell and Johnson Counties, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 2* (NRC, 2011a)
- *Environmental Impact Statement for the Lost Creek ISR Project in Sweetwater County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 3* (NRC, 2011b)
- *Environmental Impact Statement for the Dewey-Burdock Project in Custer and Fall River Counties, South Dakota: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 4* (NRC, 2014a)
- *Environmental Impact Statement for the Ross ISR Project in Crook County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 5* (NRC, 2014b)
- *Environmental Impact Statement for the Reno Creek In Situ Recovery Project in Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, Final Report NUREG-1910 Supplement 6* (NRC, 2016)

A.1.3 Potential Environmental Consequences

The Proposed Action's impact assessments for ISR, conventional mining, and milling activities are presented in Table A-1 below. After the table, see Section A.1.3.1, *Land Use*, through Section A.1.3.10, *Socioeconomics*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding the construction, operation, and closure of uranium mining and recovery facilities to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.1.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-1 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, important impact assessment differences between ISR and conventional mining are noted.

Table A-1. Uranium Mining and Milling – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment [a]***	***Impact Indicator***	***Key Information [b]***
Land Use	**SMALL to MODERATE**	Land Disturbed (acres)	120 to 1,860 – ISR 4,600 – Conventional Mining 800 – Milling
		Site Size (acres)	2,500 – ISR 16,000 – Conventional Mining
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL to MODERATE**	Tallest Substantial Structure (other than met/T-line towers)	35 ft – ISR drill rigs
Geology and Soils	**SMALL to MODERATE**	Rock and Soil Excavated	Large quantities of soil and rock removed during conventional mining
		Backfill Needed	Large quantities of backfill needed during conventional mine restoration
Water Resources	**SMALL to LARGE**	Effluent Discharge	Stormwater runoff, treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	252,000 gpd (63 million gpy/250 days/yr) – ISR
Air Quality [c]	**SMALL**	NAAQS Attainment Status	Attainment for all ISR and conventional mining sites
		Construction Emissions	Emissions from vehicles, equipment, and fugitive dust. ISR and conventional mining development activities would not contribute to an exceedance of a NAAQS.
		Operations Emissions	Emissions from vehicles, equipment, uranium ore dust, and fugitive dust. Minimal emissions from ISR activities would not contribute to an exceedance of a NAAQS.

Table A-1. Uranium Mining and Milling – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment [a]*	*Impact Indicator*	*Key Information [b]*
			Conventional mining would not contribute to an exceedance of a NAAQS with the implementation of mitigation measures. Facility licensing conditions for conventional milling would require implementation of control measures and environmental and radiation monitoring that would minimize facility air quality impacts to regulatory levels.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	SMALL to LARGE – all ISR Regions SMALL to LARGE – Conventional Mining SMALL – Milling Mitigations would be utilized to minimize the potential environmental consequences.
Historic and Cultural Resources	**SMALL to MODERATE**	Potential for NRHP property to be disturbed or impacted	Yes Mitigations would be utilized to minimize the potential environmental consequences.
		Potential for impacts on Traditional Cultural Property (TCP)	Yes Mitigations would be utilized to minimize the potential environmental consequences.
Infrastructure	**SMALL (mining) to no impacts (milling)**	Electrical Use	SMALL
		Water Use	SMALL
		Fuel Use	SMALL
Noise	**SMALL to MODERATE**	Noise Levels	80 to 98 dBA at 50 ft from the source. Noise levels attenuate to about 55 dBA L_{dn} at a distance of 1,200 ft.
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique or problematic waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL**	Occupational Risk	Five nonfatal injuries and illnesses predicted
		Construction Radiological Impacts (mrem/yr)	No quantities of radioactive material sufficient to be of concern to workers or the public
		Operations Average Worker Dose (mrem/yr)	675 to 713 – ISR 433 – Conventional Mining 700 to 1,200 – Milling
		Operations MEI Public	0.4 to 31.7 – ISR

Table A-1. Uranium Mining and Milling – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
		Dose (mrem/yr)	0.3 to 0.6 – Conventional Mining 10 – Milling
		Operations Population Dose (person-rem/yr)	0.009 to 0.36 – ISR 16 to 93 – Conventional Mining
		Operations Chemical Risk	Exposures would be mitigated.
Public and Occupational Health – Accidents	**SMALL to MODERATE**	Radiological Accidents	Consequences of accidents would be low, except for, a dryer explosion, which could result in 8.8 rem dose to a worker wearing respiratory protection. The 8.8 rem dose is above NRC limits. The dose to off-site individuals at 200 meters would be below 100 mrem. The likelihood of such an accident would be low, and therefore, the risk would also be low.
		Chemical Accidents	Releases of hazardous chemicals of sufficient magnitude to adversely impact workers and the public are possible, but are generally considered unlikely, given commonly applied safety practices and the history of safe use of these chemicals at regulated facilities.
Traffic	**SMALL to MODERATE**	Daily Vehicle Trips – Construction	400 workers/2 trucks – ISR 252 workers/80 trucks – Conventional Mining NA - Milling
		Daily Vehicle Trips – Operations	400 workers/2 trucks – ISR 252 workers/160 trucks – Conventional Mining 300 workers/80 trucks – Milling
Socioeconomics	**SMALL to LARGE**	Peak Construction Employment (direct)	200 personnel – ISR 126 – Conventional Mining NA - Milling
		Operations Employment (direct)	50 to 80 personnel – ISR 7 to 150 personnel – Conventional Mining 50 to 150 personnel – Milling
Environmental Justice	**SMALL to MODERATE At existing mines no disproportionate and adverse impacts on communities with environmental justice concerns are expected. The SMALL to**	Minority or low-income population in in the ROI	Communities with environmental justice concerns are generally not in the ROI of existing sites, or if present, would not receive disproportionate adverse impacts. Mitigations would be utilized to minimize the potential environmental

Table A-1. Uranium Mining and Milling – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
	MODERATE impact rating accommodates the uncertainty of site selection, but to determine disproportionate impacts at new sites would require site-specific analysis.		consequences identified.

Key: dBA = A-weighted decibels; ft = feet; gpd = gallons per day; gpy = gallons per year; HALEU = high-assay low-enriched uranium; ISR = in-situ recovery; L_{dn} = day-night average sound level; LLW = low-level waste; MEI = maximally exposed individual; MLLW = mixed low-level waste; mrem/yr = millirem per year; NA = not applicable; NAAQS = National Ambient Air Quality Standards; NRC = U.S. Nuclear Regulatory Commission; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; ROI = region of influence

Notes:

[a] Impacts denoted as potentially LARGE would be associated with the specific site and the extent of the mining operations.

[b] Details regarding the impacts of construction, operation, and closure of uranium mining and recovery facilities to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.1.2.2, *Existing NEPA Documentation* (Leidos, 2023).

[c] The impacts of greenhouse gases are evaluated in EIS Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.1.3.1 Land Use

Potentially SMALL to MODERATE impacts have been identified for land use associated with the decommissioning of ISR mines due to the larger area impacted by decommissioning. The assessment of individual mines in the six Supplements to the ISR GEIS (NRC, 2009a) indicate that this impact is expected to be temporary due to an initial increase in activity intensity due to the increased use of earth- and material-moving equipment and other heavy equipment and would not extend beyond the decommissioning phase of operation.

A.1.3.2 Visual and Scenic Resources

Impacts to visual and scenic resources from a conventional mine would be SMALL to MODERATE. Impacts to visual and scenic resources from mining and milling activities in support of the Proposed Action could primarily occur during construction and well field development, where vertical drilling rig masts contrast with the existing topography. Other sources of impact could include the dust generated during clearing for construction and the potential visibility of lighted drill rigs during nighttime operations. These visual impacts are usually temporary and considered SMALL. However, the impacts could be more pronounced in rural, previously undeveloped areas where the baseline visual landscape is less disturbed. Vegetation clearing and introduction of drilling rigs and roads could result in visual contracts with the baseline landscape.

Mine expansion and associated road development could also introduce visual contrasts.

A.1.3.3 Geology and Soils

The general impacts to soils and geology from conventional mine development and operation range from SMALL to MODERATE.

Impacts to soils and geology from mine construction and operation would be highly site dependent largely based on the type, size, and local characteristics of the mine. For example, a shallow shaft mine would have much smaller impacts to geology and soils than a room and pillar or open-pit mine due to the size of the staging area, which is largely dependent on amount of topsoil and overburden to be removed and stockpiled. Nearby sensitive geology can also be a factor in how geological formations are impacted and may require additional best management practices (BMPs) to mitigate.

Generally, no impacts to geology would occur during the construction and staging phase of a mine or of construction of additional support facilities at an existing fully permitted uranium mine since most activities will occur in shallow soils and would not involve removal of rock from the geological formation.

Mine operation would result in removing and stockpiling topsoil and overburden from the mine. Larger amounts of rock removed from the geological formation would be more likely to cause permanent changes to the geological formation and could potentially lead to collapse, surface subsidence, or induce earthquakes. Impacts to soils and geology could be mitigated during construction and operation of the mine by following BMPs such as those listed in Table 4.6-1 of the 2014 *Final Uranium Leasing Program Programmatic Environmental Impact Statement* (DOE, 2014) and following proper mine decommissioning and reclamation procedures.

A.1.3.4 Water Resources

Although generally ISR mining impacts to groundwater and surface water are SMALL, site-specific characteristics can result in the potential for MODERATE to LARGE impacts for some aspects of water resources.

ISR mining involves drilling wells into rock formations known to contain uranium ore, and injecting lixiviant into the wells to dissolve the uranium into groundwater, which is then pumped out of the formation so the uranium can be extracted. Potential impacts to groundwater may result from consumptive groundwater use (used during construction for dust suppression, mixing cements, and drilling support), the introduction of drilling fluids and muds during well drilling, the risk of fuel, lubricant, or similar contaminant leaks or spills, and management of wastewater. Typically, sites with deep groundwater with little hydrological connections to surface waters would see SMALL impacts from the construction, operation, aquifer restoration, and decommissioning of an ISR facility.

A leak or spill of lixiviant could result in MODERATE to LARGE impacts if the affected groundwater table is located close to the ground surface, is an important source of water for local domestic or agricultural uses, or is hydraulically connected to other important aquifers. To minimize the potential for such an impact, pipelines would be monitored frequently to quickly detect and prevent leaks or spills. Additionally, spill response and cleanup procedures would be in place to mitigate an impact in the event that a leak or spill does occur.

A.1.3.5 Ecological Resources

ISR Mining

ISR facility activities at any location would have to take into consideration current ecological conditions present at the site and to comply with the applicable regulatory requirements at that location. The level of impact would be dependent on site-specific characteristics and the presence of the resource (including threatened and endangered species) in proximity to activities.

Construction and/or land disturbance occurring within undeveloped lands associated with permitted ISR mines and mine operation could have SMALL, MODERATE, or LARGE impacts on ecological resources.[1] The degree of impact could be limited due to the implementation of BMPs and mitigation measures. The magnitude of impact would depend on the size of a new facility or extension to an existing facility and the amount of land disturbance. An inventory of threatened or endangered species would be developed during site-specific reviews to identify unique or special habitats, and Endangered Species Act consultations conducted with the U.S. Fish and Wildlife Service (USFWS) would assist in reducing/avoiding adverse impacts. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

Land-clearing activities as part of construction within undeveloped lands would likely result in increased erosion, stormwater runoff, and loss of vegetation. Additionally, impacts on wildlife could include habitat fragmentation, disturbance, and injury or mortality—as habitats within the footprint disturbed by construction and/or land disturbance could be reduced or altered. Loss of habitat could result in a long-term reduction in wildlife abundance and diversity. Habitat disturbance could facilitate the spread and introduction of invasive plant species. Wildlife habitat could be adversely affected if invasive vegetation became established in the disturbed areas and adjacent off-site habitats. Construction activities could cause wildlife disturbance, including interference with behavioral activities. Wildlife could respond in various ways, including attraction, habituation, and avoidance. Principal sources of noise would include vehicle traffic and operation of machinery. Regular or periodic noise could cause adjacent areas to be less attractive to wildlife and result in a reduction in use. Construction activities could result in the direct injury or death of certain wildlife species.

Wildlife could also be exposed to accidental fuel spills or releases of other hazardous materials. Temporary contamination or alteration of soils would be likely from operational leaks and spills and possible from transportation or land application of treated wastewater. However, detection and response to leaks and spills (e.g., soil cleanup) and eventual survey and decommissioning of all potentially impacted soil limit the magnitude of overall impacts to terrestrial ecology. Migratory birds could be affected by exposure to constituents in evaporation ponds. To avoid impacts to migratory birds, tree clearing within undeveloped lands would need to occur outside of the nesting season (late February through early August). Tree-clearing work during the nesting season would require a migratory bird nest survey 72 hours prior to the start of clearing activities. A permit would be required for the purposeful take of an active migratory bird nest. Mitigation measures such as perimeter fencing, netting, alternative sites, and periodic wildlife surveys would reduce overall impacts.

For Federally listed species present at a specific location, additional analysis would be required by the licensee to determine the severity and nature of impacts as part of the final design and description of the Proposed Action. Removal of native habitats could impact vegetation, wildlife, and possibly special status species.

Wetlands and/or water features (such as streams, lakes, ponds, or other waters) subject to protection under Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1251 et seq.) could occur within the Proposed Action area. Wetlands could be impacted by alteration of surface water runoff patterns, soil compaction, or groundwater flow. Pending facility site selection, formal wetland delineation surveys would be required to determine presence or absence of jurisdictional wetlands. Impacts to Federally protected wetlands would require licensee consultation with the U.S. Army Corps of Engineers to obtain a permit.

[1] Similar impacts could occur during decommissioning; although of potentially similar magnitude, these impacts would be associated with more temporary disturbances.

Additionally, subsequent NEPA analysis performed by the NRC or other Federal agency under these actions may also be required.

Conventional Mining

Impacts from conventional mining (including exploration, mine development and operations, and reclamation) at existing or new sites could have SMALL, MODERATE, or LARGE impacts on ecological resources. The degree of impact could be limited due to the implementation of BMPs and mitigation measures. The magnitude of impact would depend on the size of a new facility or extension to an existing facility and the amount of land disturbance. An inventory of threatened or endangered species would be developed during site-specific reviews to identify unique or special habitats, and Endangered Species Act consultations conducted with the USFWS would assist in reducing/avoiding adverse impacts. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

Impacts from exploration could result from disturbance of vegetation and soils, the removal of trees or shrubs, compaction of soils, destruction of plants, burial of vegetation under waste material, or erosion and sedimentation. The localized destruction of ecological soil crusts, where present, would be considered a longer-term impact, particularly where soil erosion has occurred. Direct impacts could include the destruction of habitats during site clearing and excavation, as well as the loss of habitat in additional use areas. Indirect impacts from mining could be associated with fugitive dust, invasive species, erosion, sedimentation, and impacts due to changes in surface water or groundwater hydrology or water quality. The deposition of fugitive dust and the establishment of invasive species, including the potential alteration of fire regimes, could result in long-term impacts. Additional habitats could be affected by any access roads or utility lines required for the mines. Impacts on wildlife could occur from habitat disturbance, wildlife disturbance, and wildlife injury or mortality and habitat loss.

Impacts on aquatic resources could result from increases in sedimentation and turbidity from soil erosion and runoff during mine development and operations. There would be a very low likelihood of an accidental ore spill into a perennial stream or river.

Potential impacts on threatened, endangered, and sensitive species could occur, depending on the location of the mines and amount of surface disturbance. Direct impacts could result from the destruction of habitats during site clearing, excavation, and operations. Indirect impacts could result from fugitive dust, erosion, sedimentation, and impacts related to altered surface water and groundwater hydrology.

A.1.3.6 Historic and Cultural Resources

ISR and Conventional Mining

New or expansion of existing mines would need to be evaluated by the licensee for impacts on historic and cultural resources and conformance with Section 106 of the National Historic Preservation Act in future NEPA site-specific documentation[2] with respect to the mining technique and location of the site to assess site-specific impacts on cultural resources.

Construction-related impacts to cultural resources can be direct or indirect and can occur at any stage of a uranium recovery project (i.e., during construction, operation, aquifer restoration, and decommissioning). Construction involving land-disturbing activities, such as grading roads, installing wells, and constructing surface facilities and well fields, are expected to be the most likely to affect historic

[2] Site-specific NEPA (or state equivalent) documentation is the responsibility of the cognizant regulatory authority, either the NRC, another Federal agency, or a state agency.

and cultural resources. These land-disturbing activities would occur for both ISR mining and conventional mining and are generally discussed below.

As needed, the NRC license applicant would be required, under conditions in its NRC license, to adhere to procedures regarding the discovery of previously undocumented cultural resources during initial construction, operation, aquifer restoration, and decommissioning. These procedures typically require the licensee to stop work and to notify the appropriate Federal and state agencies. Licensees and applicants typically consult with the responsible state and Tribal agencies to determine the appropriate measures to take (e.g., avoidance or mitigation) should new resources be discovered during land-disturbing activities at a specific facility. The NRC and licensees/applicants may enter into a memorandum of agreement with the responsible state and Tribal agencies to ensure protection of historic and cultural resources, if encountered.

Most of the potential for significant adverse effects to National Register of Historic Places (NRHP)-eligible or potentially NRHP-eligible historic properties and traditional cultural properties, both direct and indirect, would likely occur during land-disturbing activities related to conventional uranium mine development and/or expansion or building an ISR facility. Buried cultural features and deposits that are not visible on the surface during initial cultural resources inventories could be discovered during earth-moving activities. Indirect impacts may also occur outside the uranium mining project site and related facilities and components. Increased access to formerly remote or inaccessible resources, traditional cultural properties and culturally significant landscapes, as well as other ethnographically significant cultural landscapes may adversely affect these resources. Significant cultural landscapes should be identified during literature and records searches and may require additional archival, ethnographic, or ethnohistorical research that encompasses areas well outside the area of direct impacts. Indirect impacts to some of these cultural resources may be unavoidable and exist throughout the lifecycle of a conventional uranium mine or an ISR uranium recovery project.

Because of the localized nature of land-disturbing activities related to construction, impacts to historic and cultural resources are anticipated to be SMALL, but could be MODERATE for facilities located near known highly significant resources, such as Devils Tower (NRC, 2009a, p. § 4.4.8.1) or Chaco Canyon (NRC, 1997b) National Monuments. Proposed facilities or expansions adjacent to these types of properties are likely to have the greatest potential impacts. Mitigation measures (e.g., avoidance, implementation of a cultural resources management plan for all mineral operating lease areas, recording, and archiving samples) and additional consultations with the appropriate State Historic Preservation Officer and affected Native American Tribes would be needed to assist in reducing the impacts. From the standpoint of cultural resources, the most significant impacts to any sites that are present would occur during the initial mine development and/or construction within the Area of Potential Effects (NRC, 2009a, p. § 4.4.8.1).

A.1.3.7 Noise

Locations considered within this HALEU EIS are existing permitted mines on private lands; expansion of these mines within their permitted boundaries would be evaluated for impacts to noise in future NEPA documentation with respect to the mining technique and site-specific conditions. In general, mining locations are located within relatively rural and undeveloped areas, where ambient noise levels would be expected to be low. Limited sensitive noise receptors occur in these regions. HALEU activities would have to follow applicable Federal, state, or local guidelines and regulations on noise at these sites.

ISR Mining Construction

It is anticipated that because of the use of heavy equipment (e.g., bulldozers, graders, drill rigs, compressors), potential noise impacts would be greatest during expansion of existing ISR facilities. Standard construction techniques using appropriate heavy equipment would be used to build well fields and buildings and to grade access roads as required. Depending on the type of construction and equipment used, noise levels (other than occasional instantaneous levels) resulting from construction activities might reach or occasionally exceed 85 decibels A-weighted (dBA) at 50 feet from the source. Personal hearing protection would be required for workers in these areas.

Noise resulting from construction activities could impact residents within 1,000 feet of the noise sources, particularly during the night. Traffic associated with construction activities would include workers commuting to and from the jobsite, as well as relocation of construction equipment to different parts of the project. This might affect small communities located along existing roads. Because well field and facility construction activities would generally occur during daytime hours (see ISR GEIS Section 2.7), related noise would not be expected to exceed the 24-hour average sound-energy guideline of 70 dBA that the U.S. Environmental Protection Agency (EPA) (1978) determined to protect hearing with a margin of safety (NRC, 2009a, pp. 4.2-39). As a result, construction-related noise impacts would be expected to be SMALL to MODERATE (NRC, 2009a, pp. 4.2-40).

Conventional Mining Operations

During mine operations, over-the-road heavy haul trucks would transport uranium ores from conventional mines to the proposed mills and represent the potential for MODERATE noise impacts. These shipments could produce noise along the haul routes. A peak pass-by noise level of 84 dBA from a heavy truck operating at 55 miles per hour (88 kilometers per hour) was estimated in the ULP PEIS (DOE, 2014) based on the Federal Highway Administration's *FHWA Traffic Noise Model (FHWA TNM®) Technical Manual* (Menge et al., 1998). At a distance of 120 feet and 230 feet from the route, noise levels would attenuate to 55 and 50 dBA, respectively. Noise levels above the EPA guideline level of 55 dBA day-night average sound level for residential areas would be reached up to the distance of 60 feet from the route. Accordingly, EPA guideline levels would be exceeded within 230 feet of the haul route, and any residences within this distance might be affected.

Additionally, depending on local geological conditions, explosive blasting during mine development and operations might be needed. Rock blasting would be expected to last approximately 6 months and would be heard within a 1,250-foot radius. Blasting techniques are designed and controlled by blasting and vibration control specialists to prevent damage to structures or equipment. Noise controls may be implemented at the noise source (e.g., substitution of materials or equipment or changing work methods) or by attenuating noise propagation (e.g., use of barriers, enclosures, linings, or mufflers). These controls attenuate blasting noise as well. However, given the impulsive nature of blasting noise, it is critical that blasting activities be avoided at night and on weekends and that affected neighborhoods be notified in advance of scheduled blasts.

Best Management Practices

To reduce noise-related impacts, BMPs would be implemented during all phases of mine operations. Some of these practices include:

- Maintain equipment in good working order in accordance with manufacturer's specifications.
- Limit noisy activities to the least noise-sensitive times of the day (daytime between 7:00 a.m. and 7:00 p.m.) and weekdays and limit idle time for vehicles and motorized equipment.

- Notify area residents of high-noise and/or high-vibration-generating activities (e.g., above-ground and below-ground blasting) in advance.
- Employ noise-reduction devices (e.g., mufflers) as appropriate.
- Provide a noise complaint process for surrounding communities.
- Site noise sources to take advantage of topography and distance; construct engineered sound barriers and/or berms as necessary.

A.1.3.8 Public and Occupational Health – Facility Accidents

ISR Mining

Accidents associated with mining and milling of uranium are addressed, with accidents associated with ISR facility operation being the predominant contributor to worker impacts from accidents. (Impacts to the public were assessed to be SMALL for all types of mining facility accidents.) ISR mining and milling is the predominant extraction method used in the United States for uranium recovery.

The accident scenarios for conventional milling and ISR are quite similar. The differences in accident consequences would primarily be due to differences in assumed worker exposure times and in site-specific parameters such as distances to receptors and population distribution.

Accident Consequences

Radiological and nonradiological accidents could involve processing equipment failures such as yellowcake slurry spills, or radon gas or uranium particulate releases. Consequences of accidents to workers and the public would be generally low, except for a dryer explosion, which could result in worker dose above NRC limits. The likelihood of such an accident would be low, and therefore, the risk would also be low. Potential nonradiological accidents impacts include high-consequence chemical release events (e.g., ammonia) for both workers and nearby populations. As a result of operators following commonly applied chemical safety and handling protocols, the likelihood of such release events would be low. Consequently, the impacts are considered to be SMALL to MODERATE.

Radiological Impacts from ISR Process Accidents

A radiological hazards assessment considered the various stages within the ISR process. To prevent or mitigate accidents, ISR facilities are designed to contain releases and with controls, reduce the exposure to individuals in the event of an accident. As required by regulations, emergency response procedures would be in place to direct employee actions in the event of an accident. As part of worker protection, respiratory protection programs would be in place. In addition to the mitigation items discussed after each accident, additional measures would be in place to protect workers and members of the public. Employee personnel dosimetry programs are required. As part of worker protection, respiratory protection programs are in place as well as bioassay programs that detect uranium intake in employees. Contamination control programs involve surveying personnel, clothing, and equipment prior to their removal to an unrestricted area.

Thickeners are used to concentrate the yellowcake slurry before it is transferred to the dryer. Radionuclides could be inadvertently released to the atmosphere through a thickener failure and spill. A tank failure or pipe break could cause the tank contents to spill inside and outside the building. There could be external doses from the spill to workers, but off-site individuals would be too far away to observe any effects. Doses to the unprotected worker could exceed the 5-roentgen equivalent man (rem) annual dose limit specified in 10 Code of Federal Regulations (CFR) 20 if workers did not evacuate the area soon enough after the accident. Spills or leaks would normally be detected by loss of system pressure, observation, or flow imbalance. Operating procedures are developed for spill response.

Dryers used to turn wet yellowcake into dry powder present another potential hazard at an ISR facility. The two main types of dryers used are multihearth dryers for older facilities and rotary vacuum dryers for newer facilities. The multihearth dryers are assumed to be more hazardous than the rotary vacuum dryers because they operate at higher temperatures and may be direct gas fired. An explosion in the dryer could disperse yellowcake into the central processing facility. Assuming a conservative release of 2.2 pounds (lbs) of yellowcake and a respirable fraction of 1, a worker in a full-face-piece powered air-purifying respirator would obtain a dose of 8.8 rem, which would exceed the annual worker dose limit of 5 rem by 76%.

In the unlikely event of an unmitigated accident, radiation doses to the workers could have a MODERATE impact depending on the type of accident.

A.1.3.9 Traffic

For a proposed ISR mining facility, impacts could range from SMALL to MODERATE. Table 2.8-1 of the ISR GEIS (NRC, 2009a) presents vehicle trip estimates for the construction, operation, and decommissioning phases of ISR facilities. The majority of daily vehicle traffic would be generated by commuting personnel, with a small number of truck shipments per day (up to five). The ISR GEIS (NRC, 2009a) estimated that staff levels at ISR facilities range from about 20 to 200, depending on the scheduling of construction, drilling, and operational activities. For this HALEU EIS, the traffic analysis conservatively assumes that 400 daily vehicle trips from commuters would serve as an upper bound for potential daily traffic volumes (i.e., assuming 200 employees would result in one round trip or two vehicle trips per day).

For a proposed conventional mining facility, traffic impacts were assessed to range from SMALL to MODERATE, depending on the number and size of mining facilities that could be operating in a mining location. The following estimates on the number of workers and truck shipments from Alternative 3 of the ULP PEIS (DOE, 2014) were assumed for analysis of potential traffic impacts:

- An estimate of 126 workers during peak mining activities. This would result in approximately 126 daily round trips (or 252 vehicle trips) from commuting workers.
- An estimated 40 daily truck shipments (or 80 vehicle trips per day) from the mines to a mill. It was estimated that this would result in 2 to 3 additional truck shipments per hour, assuming a 16-hour workday for truck transport.
- Therefore, an estimated combined vehicle trips from conventional mining activities of up to 332 vehicle trips per day.

The additional vehicle trips from an ISR facility or conventional mine would result in increased congestion, delays, traffic hazards, and maintenance on the highways. Increases in the rate of required road maintenance could also occur from high traffic demands. The magnitude of estimated project-related transportation is expected to vary depending on whether or not expansion of an ISR or mining facility would be required or how many conventional mines would be operating at a given time. When considered with the regional annual average daily traffic (AADT) volumes, nearby public roadways would have sufficient capacity to handle the increases in daily traffic for an ISR facility or conventional mine, as long as baseline AADT volumes do not substantially increase from current volumes. Due to the potentially high increase in traffic volumes during commuting hours, traffic impacts from mining activities at ISR or conventional mining facilities would range from SMALL to MODERATE, depending on the number of personnel required.

A.1.3.10 Socioeconomics

Locations considered within this HALEU EIS are existing permitted mines on private lands; expansion of these mines within their permitted boundaries would be evaluated for socioeconomic impacts in future NEPA documentation with respect to the mining technique, site-specific conditions, and regional socioeconomic conditions. In general, existing permitted mining locations are located within relatively rural and undeveloped areas.

Major industrial projects have the potential to affect the socioeconomic dynamics of the communities in or around which they are situated. Capital expenditures and the migration of workers and their families into a community may influence factors such as regional income; employment levels; local tax revenue; housing availability; and area community services such as healthcare, schools, and public safety. Some existing permitted sites have been evaluated in previous NEPA documents that characterize and evaluate socioeconomic impacts on a site's ROI. The ROI for socioeconomic impacts is defined as a multi-county region encompassing the area in which the majority of proposed workers for HALEU mining or milling would be expected to reside and spend most of their salary, and in which a significant portion of site purchase and non-payroll expenditures from the construction, operation, and decommissioning phases of mining activities are expected to take place. With respect to the Proposed Action, the ROIs focus mainly on the host counties with existing permitted facilities and select surrounding counties with larger population centers and/or within potential commuting distance and where greatest impacts would be expected to occur.

For activities at a milling facility, Alternative 3 of the 2014 ULP PEIS (DOE, 2014) conservatively analyzed impacts for a peak year of mining activities and estimated 40 daily truck shipments (or 80 vehicle trips per day) of ore to the White Mesa Mill would occur under Alternative 3. The 2014 ULP PEIS noted that 150 employees worked at the White Mesa Mill under full operating conditions. As such, it is assumed that 150 workers would generate 300 daily vehicle trips. Therefore, a combined traffic volume of 380 daily vehicle trips from activities at the White Mesa Mill provides an upper-bound for traffic impacts and impacts would be considered SMALL as a result of the Proposed Action.

ISR Mining

The implementation of the Proposed Action could result in expansion of ISR mining occurring within existing permitted mining sites requiring construction of additional facilities. Potential impacts to socioeconomics would result predominantly from construction and operations employment at an ISR facility and demands on the existing public and social services, housing, infrastructure (schools, utilities), and the local workforce. The impact assumptions regarding workforce requirements used in the ISR GEIS are considered applicable to the Proposed Action and are carried forward in this analysis. The evaluation of employment impacts typically includes estimating the level of direct and indirect employment created by a proposed action. Direct employment refers to jobs created by the proposed construction activities and facility operations. Indirect employment refers to jobs created in the ROI to support the needs of the workers directly employed by a proposed action and jobs created to support site purchase and non-payroll expenditures.

The direct impact to population, employment, and social services from ISR mining activities would be dependent upon how many of the construction and operations workers would be obtained from within the ROI. If all workers were obtained from within an ROI, then there would be no change in the ROI total population; however, if any workers were introduced from outside the ROI, there would be potential impacts to regional demography in conjunction with the in-migration of the supporting workforce and their families. Where the impacts occur would also depend on where incoming workers chose to live, and whether there is good distribution across an ROI or workers concentrate in one area.

Construction

The general findings for construction impacts from ISR construction activities, as described in the ISR GEIS, are applicable to the Proposed Action and its associated regions of influence, as summarized below.

The NRC's ISR GEIS (NRC, 2009a) assumed that total peak construction employment would be about 200 people, including company employees and local contractors, depending on timing of construction with other stages of the ISR lifecycle. The construction period would be short term (12 to 18 months). The general practice would be to use local contractors as available; however, the ISR GEIS identified a potential influx population if the majority of construction requirements were filled by a skilled workforce from outside of the region—ranging from 480 to 560 persons, depending on location (uranium mining region)—if all workers brought their families, based on an average household size per family (the average household size was updated to reflect current averages for household size by state in 2021).

A total of about 140 ancillary (indirect) jobs could be created for the proposed HALEU ISR mining activities as a bounding analysis. However, in reality, construction workers are less likely to relocate their entire family to the region for short-term work thus minimizing impacts from an outside workforce. If the majority of the construction workforce is filled from within the region, impacts to population and demographics would be SMALL for the ROI, but the potential impact on smaller counties and communities could be MODERATE, especially if workers choose to live close to the mining site and concentrate in a small populated nearby community. In general, potential impacts would be greatest on local communities with small populations.

An influx of 200 workers would be expected to have a SMALL to MODERATE impact to the employment structure, depending on where the workers settle. The use of outside workers would be expected to have a MODERATE (beneficial) impact to communities with high unemployment rates due to the potential increase in job opportunities. But if the majority of construction workers are pulled from the local workforce, the impacts would be SMALL. In addition, relocated workers to the project area would contribute to the local economy through purchasing goods and services and taxes. Because of the small relative size of the ISR workforce, net impacts would be SMALL within the ROI and beneficial to the local economy. But the potential economic benefits upon smaller communities and counties could be MODERATE.

Local building materials and building supplies would be used to the extent practical. Most employees would live in larger communities with access to more services. Some construction employees, however, would commute from outside the county or the ROI to the ISR facility, and skilled employees (e.g., engineers, accountants, managers) would come from outside the local workforce. For purposes of this analysis, it is assumed that the majority of construction requirements would likely be filled by a skilled workforce from outside of the region. Assuming a peak workforce of 200, this influx of workers and their families could result in a SMALL to MODERATE impact in the region.

Local finance would be affected by ISR construction through additional taxation and the purchase of goods and services. Not all states have an income tax (e.g., Wyoming), but every state has other taxes (e.g., sales, lodging, use) that construction workers would be expected to contribute toward while working at the ISR facility. In addition, Wyoming imposes an "ad valorem tax" on mineral extraction. It is anticipated that ISR facility development could have MODERATE impacts on local finances within each of the ROIs; such impacts would be considered beneficial.

Operation

Employment levels for HALEU ISR facility operations would be less than those for construction, with total peak employment (50 to 80 personnel) depending on timing and overlap with other stages of the ISR lifecycle. Assuming the 70% of these workers would in-migrate to the area and bring their families, the potential impact to the local population and public services resulting from an influx of workers (maximum range of 50 to 60) and their families (total of 160 persons) would range from SMALL to MODERATE, depending on the location (proximity to a population center) of an ISR facility with the ROI.

Potential impacts on housing could be MODERATE at some locations, due to a limited number of available units (assumes one unit per worker family), if workers are not distributed throughout the ROI or there are no other large population centers within commuting distance.

The increase in job, income, and revenues generated from Federal, state, and local taxes on the facility and the uranium produced would result in a SMALL to MODERATE beneficial impact to the local and regional economy, similar to construction impacts, depending on the extent to which a local workforce is used. If the entire labor force came from outside the affected community, the economic impacts could be MODERATE in one of the smaller counties.

A.1.3.11 Environmental Justice

Minority populations were evaluated using the 50% analysis and meaningfully greater analysis for potentially affected block groups within the ROI. If a block group's percentage of minority individuals was greater than 50%, or more than 20% of the percentage of the total minority population within the state percentage (block groups were compared to the state percentage in which they were located), then the block group was identified as having a minority population. Similar analysis was also conducted to determine the presence of low-income populations.

La Jara Mesa – Cibola County, New Mexico

The environmental impacts from construction of the Proposed Action that have been discussed in this EIS would not disproportionately impact communities with environmental justice concerns because there are no communities within 10 miles of the site. The population of the census tract containing the project (34.5% minority) does not have a meaningfully greater minority status than other populations in the county or state as a whole or a disproportionately lower income (16.8% below the poverty level).

Roca Honda Mine – McKinley and Cibola Counties, New Mexico

The total population of McKinley County, New Mexico, is 72,902, of which 91.7% would be considered members of a minority population. The total population of Cibola County, New Mexico, is 17,172, of which 78.7% would be considered members of a minority population. Both counties' minority populations exceed 50% of their total populations. Both counties' minority population percentage is meaningfully greater than the percentage of minorities in New Mexico as a whole. Therefore, both counties are considered to be communities with environmental justice concerns. The total population of McKinley County, New Mexico, is 72,902, of which 33.5% would be considered a low-income population (USCB, 2023a). The total population of Cibola County, New Mexico, is 17,172, of which 27.3% would be considered a low-income population (USCB, 2023b). McKinley County's low-income population is 15.9% higher than New Mexico state's low-income population (17.6%) (USCB, 2023c) and is therefore considered to be a community with environmental justice concerns. The proposed Roca Honda mine would be likely to result in disproportionate and adverse impacts to these communities with environmental justice concerns.

These impacts could potentially create beneficial impacts due to the provision of jobs and economic opportunities in communities with environmental justice concerns; however, they are expected to cause adverse impacts of SMALL magnitude due to potential health risks for minors and nearby residents of San Mateo. Additionally, adverse mental health impacts of MODERATE magnitude would occur to Tribal nations due to mine development within the spiritually significant Mt. Taylor, which is designated as a traditional cultural property. This site is not expected to cause significant traffic or produce time delays. Therefore, impacts associated with access to recreation, hospitals and public health facilities, and places of worship would be minimal. Occupational health impacts to miners from exposures to unsafe levels of radon and other hazards would be SMALL. Public health impacts would be limited to fugitive dust, diesel and heavy vehicle emissions from activities of drilling, blasting, use of heavy equipment, and the transportation of materials; however, there are legacy health issues of concern as the proposed site is located in areas with unresolved legacy contamination. This site is not expected to expose children to toxic substances or radionuclides, though it would potentially create impacts of negligible to SMALL magnitude due to increased risk of inhaling fugitive dust and exhaust emissions from vehicles and mining equipment.

Both beneficial and adverse effects on communities with environmental justice concerns would likely be significant and cause disproportionate and adverse effects ranging from SMALL to MODERATE. The beneficial effects could occur by improving economic prospects for approximately two decades of the mine life in an area with high unemployment, high poverty rates, and high minority populations. The adverse effects would stem from a perception among some in the population of unacceptable health and environmental risks as well as spiritual and psychological harm inflicted on American Indian populations.

Moore Ranch ISR Project – Campbell County, Wyoming

The proposed construction, operation, and decommissioning of the proposed ISR facility and aquifer restoration would not have disproportionate and adverse effects on communities with environmental justice concerns residing in the vicinity of the proposed Moore Ranch ISR Project.

Nichols Ranch ISR Project – Campbell, Johnson, and Natrona Counties, Wyoming

No disproportionate and adverse impacts would occur because no significant concentrations of communities with environmental justice concerns live within the project's ROI, which consists of Campbell, Johnson, and Natrona Counties.

Lost Creek ISR Project – Sweetwater County, Wyoming

No communities with environmental justice concerns were identified in the vicinity of the proposed Lost Creek ISR Project. Therefore, there would be no disproportionate and adverse impacts on communities with environmental justice concerns from the construction, operation, aquifer restoration, and decommissioning of the proposed ISR facility at Lost Creek.

Dewey-Burdock Project – Custer and Fall River Counties, South Dakota, and Weston County, Wyoming

The percentage of minority populations living in affected block groups in the vicinity of the proposed Dewey-Burdock ISR Project site in Custer and Fall River Counties in South Dakota and Weston County in Wyoming is not meaningfully greater than the percentage of minority populations recorded at the state and county levels and is well below the national level. Furthermore, the percentage of low-income populations living in affected census tracts in the vicinity of the proposed project site in Custer, Fall River, and Weston Counties is not meaningfully greater than the percentage of low-income populations recorded at the state or county level. Therefore, there would be no disproportionate and adverse impacts on communities with environmental justice concerns from the construction, operation, aquifer restoration, and decommissioning of the proposed Dewey-Burdock ISR facility.

Ross ISR Project – Crook County, Wyoming

No communities with environmental justice concerns were identified in the vicinity of the proposed Ross ISR Project. Therefore, there would be no disproportionate and adverse impacts on communities with environmental justice concerns from the construction, operation, aquifer restoration, and decommissioning of the Ross ISR Project.

Reno Creek ISR Project – Campbell County, Wyoming

The percentage of minority populations living in affected block groups in the vicinity of the proposed Reno Creek ISR Project area in Campbell County, Wyoming, is not meaningfully greater than the percentage of minority populations recorded at the state and county level and is well below the national level. Furthermore, the percentage of low-income populations living in affected census tracts in the vicinity of the proposed project area is not meaningfully greater than the percentage of low-income populations recorded at the state or county level. Therefore, there would be no disproportionate and adverse impacts to communities with environmental justice concerns from the construction, operation, aquifer restoration, and decommissioning of the proposed Reno Creek ISR Project.

A.2 Uranium Conversion

A.2.1 Introduction

In support of the Proposed Action, HALEU conversion facilities would be needed to convert natural uranium yellowcake (the product of uranium extraction from uranium ore-bearing material) to uranium hexafluoride (UF_6) that would be used as feed material for a HALEU enrichment facility.

Only one domestic conversion facility currently exists in the United States, the Honeywell International Metropolis Works Uranium Conversion Facility (the Metropolis Works Plant, or “the Metropolis facility”) near Metropolis, Illinois.[3] This NRC-licensed facility restarted operations in April 2023 after over 5 years in a ready-idle mode. The Metropolis facility has the licensed capacity to produce up to 15,000 metric tons per year (MT/yr) of UF_6. To meet the amount of HALEU required under the Proposed Action, about 20% of the plant’s capacity would be utilized. The prior NEPA analysis for that site is used in this HALEU EIS to develop the assessment of the potential impacts of converting about 2,600 MT/yr of yellowcake annually into the 3,100 MT/yr of UF_6, annually, for subsequent use in a HALEU enrichment facility.

Existing NEPA documentation regarding construction of a new conversion facility is unavailable[4]. Thus, NEPA documentation for construction and operation of a deconversion facility, *Environmental Impact Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico – Final Report* (referred to as the “Fluorine/DU EIS”) (NRC, 2012a), was used as the

3 ConverDyn, a general partnership between Honeywell and General Atomics, acts as the sole marketing entity for UF_6 produced at the Metropolis facility.

4 The Metropolis EA (NRC, 2019) was prepared to support relicensing of the facility and therefore only evaluates continued operations.

basis for the analysis of the construction of a new conversion facility. The construction of any new conversion facility would require separate site-specific NEPA analysis prepared by the NRC.

A.2.2 Analysis Methodology

A.2.2.1 Approach to NEPA Analyses

The conversion activity for the Proposed Action includes operation of a conversion facility for about 6 years. This could be at either a new facility or the Metropolis facility, which would require no modifications to meet the project conversion demands. Although the Metropolis facility is referenced specifically, the use of the available NEPA documentation for this facility provides information on the kind and significance of impacts that could be incurred through the use of any existing or new facility. In no way is the application of previous NEPA analysis intended to indicate a preference for the use of any particular facility in the HALEU fuel cycle.

No conversion facility has been constructed in the United States since the construction of the Metropolis facility, built in 1958. As this is well before NEPA was enacted, little to no environmental information is available for the construction of a conversion facility. However, a new conversion facility would be a new chemical processing facility. The effort, materials, and impacts of its construction would not be significantly different from a comparably sized facility that performs a different but similar chemical processing function. This HALEU EIS assesses impacts associated with the construction of several types of facilities: enrichment, deconversion, and storage. For the assessment of the impacts of constructing a conversion facility, the construction of the deconversion facility could be used as a surrogate. The proposed fluorine extraction process and depleted uranium (DU) deconversion plant in Lea County, New Mexico, is sized to process 3,400 metric tons (MT) of DU per year (NRC, 2012a). A conversion facility producing enough UF_6 to support the production of 290 MT of HALEU would operate with an annual production capacity of approximately 2,520 MT/yr of yellowcake (assuming 6 years of operation). As a first approximation, the new conversion facility would be slightly smaller than the proposed deconversion facility and the impacts of constructing the conversion facility should be bound by those of constructing the deconversion facility.

The NRC completed the *Environmental Assessment for the Proposed Renewal of Source Material License SUB–526 Metropolis Works Uranium Conversion Facility (Massac County, Illinois)* (referred to as the “Metropolis EA”) that evaluated the impacts of renewing the operating license of the Metropolis facility for 40 years (NRC, 2019). The affected environment discussions and environmental impact analyses for the operation of a HALEU conversion facility are adopted by reference from the Metropolis Environmental Assessment (EA) (NRC, 2019) for the Metropolis facility, with additions to update the discussions to current conditions where needed. The impact analyses take into consideration that the annual conversion demand for the Proposed Action would be about 20% of the annual conversion production and resulting impacts evaluated in the Metropolis EA. In other words, annual impacts identified in the Metropolis EA would substantially bound annual impacts expected from the Proposed Action. However, short-term impacts, such as a daily period, could be similar between the HALEU activities and the activities evaluated in the Metropolis EA (although most of the impacts identified in the Metropolis EA are expressed as annual impacts). The analyses consider project and environmental controls, and if needed, mitigations that would minimize project impacts.

The impact analyses for conversion in the HALEU EIS include the same impact conclusion statements as those stated in the Metropolis EA, such as the project impact “would not be significant” or “would have no significant impacts.”

A.2.2.2 Existing NEPA Documentation

As discussed previously, the Metropolis facility has sufficient conversion capacity to support the needs of the Proposed Action. The Metropolis EA (NRC, 2019) covers all of the activities associated with uranium conversion and was used to determine potential impacts associated with facility operations. Potential impacts for construction of a new facility were extracted from the Fluorine/DU EIS as a surrogate. These documents and other NEPA resource documents include:

- *Final Environmental Impact Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico, NUREG-2113* (NRC, 2012a)
- Metropolis EA (NRC, 2019)

A.2.3 Potential Environmental Consequences

The environmental consequences associated with the operation of a HALEU conversion facility to produce the quantities of UF_6 needed to support the Proposed Action are expected to be bounded by the consequences of operation of the Metropolis facility at full capacity as analyzed in the EA produced during the license renewal for that facility.[5] Therefore, DOE has summarized the environmental consequences information from the Metropolis EA (NRC, 2019) and used this information to inform the assessment of the impacts associated with operation of a HALEU conversion facility in support of the Proposed Action. Potential impacts for construction of a new facility were developed using information from the Fluorine/DU EIS (the International Isotopes Fluorine Products, Inc. [IIFP] facility).

The Proposed Action's impact assessments for uranium conversion are presented in Table A-2 below. After the table, see Section A.2.3.1, *Ecological Resources*, through Section A.2.3.3, *Socioeconomics*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding a conversion facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.2.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-2 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, differences between the Metropolis and IIFP facilities are noted.

Table A-2. Uranium Conversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment [(a)]*	*Impact Indicator*	*Key Information [(b)]*
Land Use	**No significant impact or SMALL**	Land Disturbed (acres)	NA – Metropolis 40 – IIFP
		Total Site Size (acres)	1,000 – Metropolis 640 – IIFP
Visual and Scenic Resources	**No significant impact or SMALL**	Tallest Substantial Structure (other than met/T-line towers) (feet)	100 – IIFP

[5] The NRC renewed the license for the Metropolis facility in March 2020, which expires on March 24, 2060.

Table A-2. Uranium Conversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment*** [(a)]	***Impact Indicator***	***Key Information*** [(b)]
		Distance to Nearest Receptor (miles)	1.6 – IIFP
		BLM VRM Rating	Class IV – Metropolis
Geology and Soils	**No significant impact or SMALL**	Backfill Needed (cubic yards)	NA – Metropolis 200 – IIFP
Water Resources	**No significant impact or SMALL**	Effluent Discharge	Stormwater runoff and treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	3,024 to 4,464 – IIFP
		Floodplains	While portions of the property are located within a floodplain, the Metropolis facility restricted area (i.e., where facilities are built/utilized) is not.
Air Quality [(c)]	**No significant impact or SMALL**	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Emissions from vehicles, equipment, and fugitive dust.
		Operations emissions	Emissions from (1) vehicles; (2) uranium compounds, hydrogen fluoride, and other gaseous and particulate effluents released from rooftop vents; and (3) process equipment. Emission controls and regulatory compliance required by a state permit and the NRC would limit emissions to acceptable levels and less than the NAAQS.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	None – Metropolis SMALL – IIFP
Historic and Cultural Resources	**No impacts or SMALL to MODERATE**	NRHP property potentially disturbed or impacted	No – Metropolis No – IIFP
		Potential for impacts on Traditional Cultural Property (TCP)	None identified for Metropolis or IIFP
Infrastructure	**No impacts or SMALL**	Electrical Use	No increase in utility usage for Metropolis
		Water Use	See Water Resources
		Fuel Use	No increase in utility usage for Metropolis
Noise	**No significant impacts or SMALL**	Distance to Off-Site Receptor (miles)	0.3 – Metropolis 1.6 – IIFP
		Noise Levels	Noise levels would remain at baseline levels for Metropolis. Below EPA guideline of 55 dBA as L_{dn} for residential zones for IIFP.

Table A-2. Uranium Conversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique or problematic waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**No significant impacts or SMALL**	Occupational Risk	The Metropolis facility has had no occupational fatalities and the reportable work injury rate was 2.5/yr for the period of 2010 to 2014. Fewer than 100 accidents and no fatalities for construction at IIFP.
		Construction Radiological Impacts (mrem/yr)	NA – Metropolis Worker: 5 to 89 – IIFP No impacts to the public – IIFP
		Operations Average Worker Dose (mrem/yr)	127 – Metropolis 75 – IIFP
		Operations MEI Public Dose (mrem/yr)	2.17 – Metropolis 0.002 – IIFP
		Operations Population Dose (person-rem/yr)	4.52 – Metropolis 0.04 – IIFP
		Operations Chemical Risk	Uranium and fluorine are the primary chemical hazards.
Public and Occupational Health – Accidents	**SMALL**	Radiological Accidents	The most significant accident consequences could result in a worker dose of 122 rem and an off-site population dose of 72 person-rem. All the accident scenarios predict less than one lifetime cancer fatality in the off-site population.
		Chemical Accidents	The most significant accident consequences could result in workers exposed to hydrogen fluoride at 58,500 mg/m^3 with 26.4 mg/m^3 at the controlled area boundary. Consequences to the maximally exposed member of the public are high on the basis of uranium exposure (> 13 mg/m^3) and intermediate for hydrogen fluoride exposure (between 0.8 and 28 mg/m^3).
Traffic	**SMALL**	Construction – Daily Vehicle Trips: Workers/Trucks	NA – Metropolis 280/40 –IIFP
		Operations – Daily Vehicle Trips: Workers/Trucks	422/20 – Metropolis 280/20 – IIFP
Socioeconomics	**SMALL to MODERATE**	Peak Construction Employment (direct)	NA – Metropolis 140 – IIFP
		Operations Employment	298 – Metropolis

Table A-2. Uranium Conversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment*** [(a)]	***Impact Indicator***	***Key Information*** [(b)]
		(direct)	140 – IIFP
		ROI Labor Force	36,679 – Metropolis
Environmental Justice	**No disproportionate and adverse impacts on communities with environmental justice concerns are expected**	Minority or low-income population in ROI	1 minority and 7 low-income block groups near Metropolis. Nearest community with environmental justice concerns is 14 miles from IIFP.

Key: > = greater than; BLM VRM = Bureau of Land Management Visual Resources Management; dBA = A-weighted decibels; EPA = U.S. Environmental Protection Agency; ft = feet; gpd = gallons per day; HALEU = high-assay low-enriched uranium; IIFP = International Isotopes Fluorine Products; L_{dn} = day-night average sound level; LLW = low-level waste; MEI = maximally exposed individual; mg/m^3 = milligram per cubic meters; MLLW = mixed low-level waste; mrem/yr = millirem per year; NAAQS = National Ambient Air Quality Standards; NEPA: National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; ROI = region of influence

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site of new construction.

[b] Details regarding the impacts of operating an existing uranium conversion facility to support HALEU production were developed from relevant NEPA documentation listed in Section A.2.2.2, *Existing NEPA Documentation* (Leidos, 2023).

[c] The impacts of greenhouse gases are evaluated in EIS Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.2.3.1 Ecological Resources

Impacts on ecological resources from the construction of a new conversion facility could occur from removal or degradation of vegetation, wildlife habitats, wetlands, and Federal- and state-listed species, as well as by contamination by radioactive or hazardous materials via an airborne or waterborne pathway. Construction of a new conversion facility at an existing industrial site would likely occur on previously disturbed areas and have the potential to impact up to 40 acres. Impacts to ecological resources would be SMALL if new construction were to occur entirely within previously developed and disturbed lands. Construction of a new conversion facility at a new location has the potential to impact terrestrial and aquatic resources, wetlands, and threatened and endangered species. The degree of impact, while limited due to the relatively small size of the facility and the implementation of BMPs, would be dependent upon the ecological characteristics of the selected site. While the Fluorine/DU EIS (NRC, 2012a) identified impacts as SMALL for construction, any new construction occurring within undeveloped lands could have SMALL or MODERATE impacts on ecological resources depending on the resources disturbed, mitigation, and the minimization measures employed. An inventory of threatened or endangered species would be developed during site-specific reviews to identify unique or special habitats, and Endangered Species Act consultations conducted with the USFWS would assist in reducing/avoiding adverse impacts. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

A.2.3.2 Historic and Cultural Resources

The impacts on historic and cultural resources of construction of a new conversion facility at an existing uranium fuel cycle facility or industrial site on previously disturbed land, would likely be SMALL. Construction of a new conversion facility at an undeveloped location has the potential to impact historic and cultural resources. The degree of impact, while limited due to the relatively small size of the facility and the implementation of BMPs, would be dependent upon the historic and cultural characteristics of the selected site. Because of this, the impacts of construction at a previously undeveloped site are expected to be SMALL to MODERATE.

A.2.3.3 Socioeconomics

Given the small in-migrating population expected to move into the area and the fact that all the potential sites are well established industrial sites, the socioeconomic impacts associated with a new conversion facility would be expected to be SMALL in the ROI. In addition, the economic impacts (e.g., increased jobs, income, and tax revenues) would be considered beneficial to the local and regional economy. In the event a larger (than analyzed) workforce moved into the ROI and a majority of workers chose to reside in the host county, particularly at one of the sites where the host county is more rural in nature and has lower population numbers (and a low population density), the potential impacts could be SMALL to MODERATE, as the higher numbers could adversely affect housing availability and community services such as education, fire protection, law enforcement, and medical resources. At the same time, however, the corresponding increases in income, spending, and tax revenues that would result from a larger workforce would help benefit the local economy, and the increased revenues could be used to enhance existing public services that might be deficient.

A.3 Uranium Enrichment

A.3.1 Introduction

As part of the Proposed Action and related activities, a HALEU enrichment facility would enrich natural uranium to at least 19.75 and less than 20 weight percent uranium-235 (U-235). Current domestic enrichment facilities are licensed to enrich uranium to LEU levels of about 5% and a demonstration project for enrichment to HALEU is also underway Enrichment of uranium less than 10% can be done in an NRC Category III facility (the lowest security category for fuel cycle facilities). Enrichment levels between 10% and 20% requires greater security (NRC Category II). Using the excess capacity of existing facilities to enrich uranium up to less than 10% may be more economical, in that it could result in the construction of smaller NRC Category II enrichment facilities for the HALEU program. Using existing facilities is only one option for creating a HALEU enrichment capability. Several options are available to support the domestic, commercial production of HALEU enriched to at least 19.75 and less than 20 weight percent U-235:

- Construction of a new enrichment facility capable of using natural uranium as feed and producing HALEU enriched to at least 19.75 and less than 20 weight percent U-235
- Modification of existing enrichment facilities that currently produce LEU
- Use of existing enrichment facilities to produce LEU and augmentation of the existing facilities with new facilities to enrich the LEU to HALEU

This EIS considers three uranium enrichment sites as the basis for the assessment of impacts from the construction and operation of a HALEU enrichment facility; the Urenco USA (UUSA) National Enrichment

Facility (NEF) in Lea County, New Mexico, the Centrus American Centrifuge Plant in Piketon, Ohio, and a proposed Global Laser Enrichment (GLE) facility in Wilmington, North Carolina.[6]

A.3.2 Analysis Methodology

A.3.2.1 Approach to NEPA Analyses

In this section, DOE analyzed the potential impacts of constructing and operating a HALEU enrichment facility using gaseous centrifuge enrichment at the UUSA site in Eunice, New Mexico; gaseous centrifuge enrichment at the Centrus Energy site in Piketon, Ohio; and SILEX (laser) enrichment at the GLE site in Wilmington, North Carolina.

While enrichment facilities at one or more of these locations could supply enriched uranium to support the HALEU commercialization effort, DOE has considered the construction and operation of a facility that could produce up to 38 MT of HALEU in the form of UF_6 enriched to 19.75% U-235 per year at each location. This approach provides the upper bound of impacts that could occur at each site. To meet the required production of 50 MT/yr of HALEU metal, multiple enrichment facilities would be needed.

This HALEU EIS extracts from and incorporates, by reference, prior NEPA documentation and analysis conducted at each site (i.e., UUSA, Centrus, and GLE). These facilities were designed to produce LEU enriched from less than 5% to less than 10% U-235. This HALEU EIS considers new facilities that would be required at each site to support approximately 1.1 million separative work units (SWUs) per year to produce 38 MT of HALEU in the form of UF_6. Construction of a new HALEU facility at the Centrus or GLE site would be expected to take place in areas previously designated for commercial enrichment facilities that were licensed but never constructed. If new construction occurs outside of previously planned areas, it is still expected that the new facilities would remain within existing site boundaries, thereby avoiding sensitive resources in the surrounding environment. For example, the expansion of the UUSA NEF to a 10 million SWU capacity (see Figure A-1) would result in additional buildings being constructed within the existing plant site boundaries.

A commercial enrichment facility for LEU has been constructed and is currently operating at the UUSA site. This HALEU EIS assumes that a HALEU facility at this location would be in addition to the facilities that are currently enriching uranium at that site.

When extracting from prior analyses in existing NEPA documents, DOE reviewed potential changes in baseline data or circumstances, as well as any unique differences related to HALEU enrichment compared to LEU enrichment. HALEU collection, storage, and transport would require some modifications compared to the same actions in an LEU enrichment facility. Preventing an accidental criticality would require administrative controls (potentially more stringent than for LEU) and could require equipment modifications for feed withdrawal from the centrifuges. These changes would be a minimal part of the enrichment process (relatively small quantity of HALEU material compared to feed material and DU) and thus, should not greatly change the assessment of impacts between an LEU enrichment facility and a HALEU enrichment facility. This HALEU EIS focuses on these changes and differences when presenting affected environment and analyzing potential impacts. It is important to note that a HALEU facility at one of these locations will require either a license amendment or new license for special nuclear material (SNM). The respective applications would include facility details that are not known at this time that would be reviewed by the NRC under NEPA.

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6 The GLE facility had applied for an NRC license and submitted environmental documentation in support of the license application. The application was terminated by the applicant before the facility was constructed.

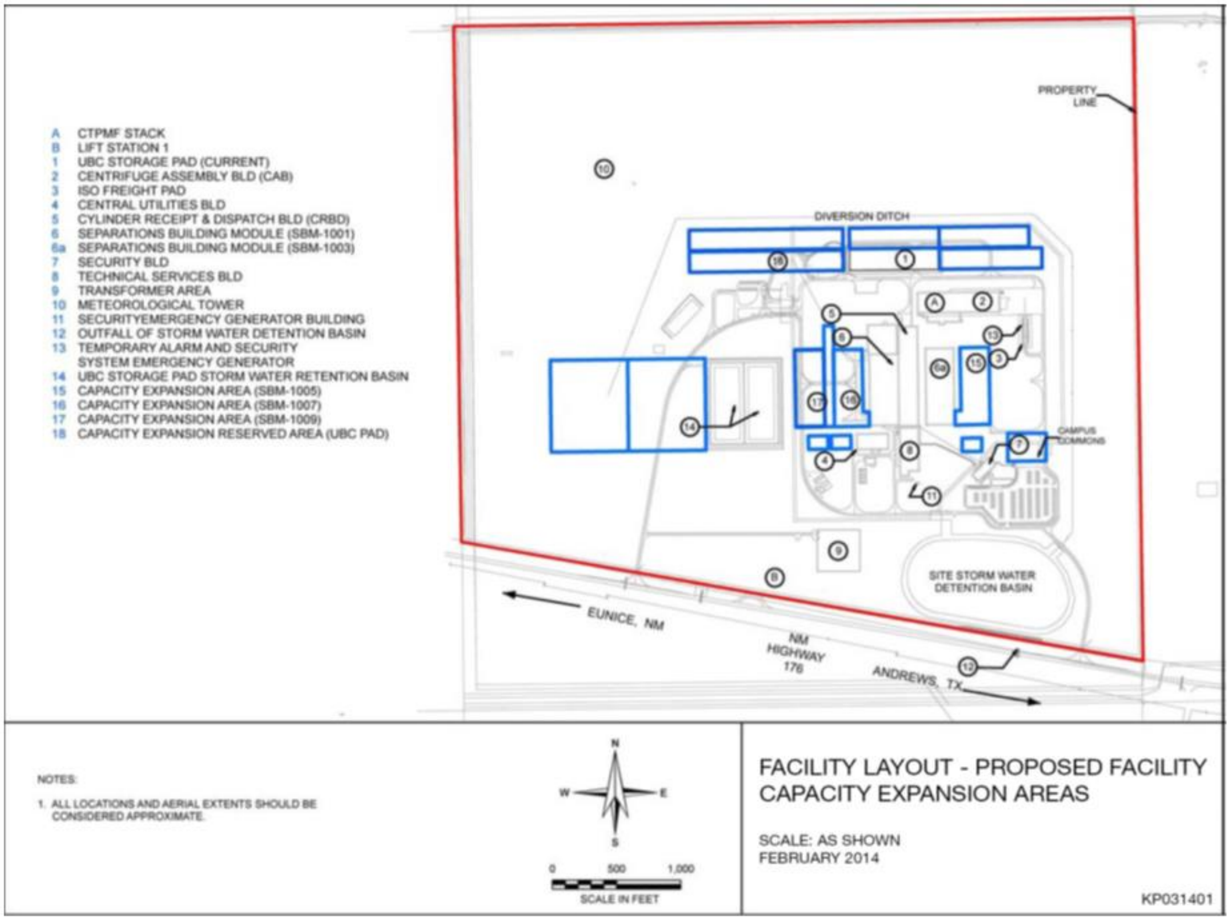

Figure A-1. 2014 Proposed Expansion to 10 Million SWUs (NRC, 2015)

A.3.2.2 Existing NEPA Documentation

The NRC prepared EISs for all three commercial enrichment facilities. In addition, the NRC prepared an EA for the UUSA site (NRC, 2015) for the expansion of the facility from 3 million SWUs per year to 10 million SWUs per year. The NRC also prepared EAs for the Centrus site for a centrifuge demonstration project (at the Lead Cascade Facility) in 2004 and for an amendment to the facility license to demonstrate HALEU production in 2021 (NRC, 2021a). These documents and other NEPA resource documents include:

- **UUSA** – *Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico, Final Report, NUREG-1790* (NRC, 2005a)

  Environmental Assessment for the Proposed Louisiana Energy Services, URENCO USA Uranium Enrichment Facility Expansion, Lea County, New Mexico (NRC, 2015)
- **Centrus** – *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio, NUREG-1834* (NRC, 2006)

  Finding of No Significant Impact for the United States Enrichment Corporation Incorporated, American Centrifuge Lead Cascade Facility at Piketon, Ohio (DOE, 2004a)

  Environmental Assessment for the Proposed Amendment of the US Nuclear Regulatory Commission License Number SNM-2011 for the American Centrifuge Plant in Piketon, Ohio (NRC, 2021a)

- **GLE** – *Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina, NUREG-1938* (NRC, 2012b)

  Note: The 2008 Environmental Report (ML090890503) submitted to the NRC in support of the license application may also contain relevant information.

Additional NEPA documents related to DU management that may be useful are:

- *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DOE/EIS-0269)* (DOE, 1999)
- *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky Site (DOE/EIS-0359)* (DOE, 2004b)
- *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio Site (DOE/EIS-0360)* (DOE, 2004c)
- *Final Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride (DOE/EIS-0359-S1 and DOE/EIS-0360-S1) (DOE, 2020)*

A.3.3 Potential Environmental Consequences

The environmental consequences from construction and operation of a facility that enriches natural uranium to 19.75% HALEU are expected to be comparable to those from a facility that enriches to 5% LEU. Therefore, DOE reviewed the environmental consequences information from existing NEPA documents for the three enrichment facilities identified above and used this information to inform the assessment of the impacts associated with construction and operation of a HALEU enrichment facility.

The Proposed Action's impact assessments for enrichment are presented in Table A-3 below. After the table, see Section A.3.3.1, *Water Resources*, through Section A.3.3.7, *Environmental Justice*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding an enrichment facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.3.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-3 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences between UUSA, Centrus, and GLE are noted.

Table A-3. Uranium Enrichment – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Land Use	**SMALL**	Land Disturbed (acres)	394 – UUSA 51 – Centrus 226 – GLE
		Total Site Size (acres)	543 – UUSA 3,700 – Centrus 1,621 – GLE
		Compatible with Land Use Plans	Likely

Table A-3. Uranium Enrichment – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment*** [(a)]	***Impact Indicator***	***Key Information*** [(b)]
Visual and Scenic Resources	**SMALL**	Tallest Substantial Structure (other than met/T-line towers) (ft)	131 – UUSA 160 – GLE
		BLM VRM Rating	Class III or IV
Geology and Soils	**SMALL**	Rock and Soil Excavated	Minimal
		Backfill Needed	Minimal
Water Resources	**SMALL to MODERATE**	Effluent Discharge	Stormwater runoff, treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	44,500 – UUSA 650,000 – Centrus 86,000 – GLE
		Floodplains	While portions of the GLE site are located within the floodplain, the North-Central Site Sector in which facilities are located is not.
Air Quality [(c)]	**SMALL**	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Emissions from vehicles, equipment, and fugitive dust. Activities would not contribute to an exceedance of a NAAQS with the implementation of mitigation measures.
		Operations emissions	Emissions from (1) vehicles; (2) uranium compounds, and hydrogen fluoride; and (3) process equipment and backup diesel generators. Facility air emissions would be below applicable regulatory levels and would not contribute to an exceedance of a NAAQS.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	None – UUSA MODERATE – Centrus SMALL to MODERATE – GLE
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP Property Potentially Disturbed or Impacted	No – UUSA Yes – Centrus Mitigations would be utilized to minimize the potential environmental consequences identified.
		Potential for impacts on Traditional Cultural Property (TCP)	None identified for UUSA, Centrus, and GLE

Table A-3. Uranium Enrichment – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [a]	*Impact Indicator*	*Key Information* [b]
Infrastructure	**SMALL to MODERATE**	Electrical Use	13 MW – UUSA 16% of analyzed capacity for Centrus 18% of analyzed capacity for GLE
		Water Use	See Water Resources
		Fuel Use	48 million cubic ft/yr natural gas – UUSA 16% of analyzed capacity for Centrus 18% of analyzed capacity for GLE
Noise	**SMALL to MODERATE**	Distance to Off-Site Receptor (miles)	2.6 – UUSA 0.6 – Centrus 0.8 – GLE
		Noise Levels	Construction noise 53 L_{dn} Operations noise primarily inside buildings.
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique or problematic waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL**	Occupational Risk	Fewer than 100 accidents and no fatalities for construction 4 injuries per year and no fatalities for operations
		Construction Radiological Impacts (mrem/yr)	Worker: 5 – UUSA 89 – Centrus 10.5 – GLE No impacts to the public.
		Operations Average Worker Dose (mrem/yr)	97 – UUSA 29 – Centrus 50 to 75 – GLE
		Operations MEI Public Dose (mrem/yr)	0.002 – UUSA 0.03 – Centrus 5×10^{-5} – GLE
		Individual facilities – Operations Population Dose (person-rem/yr)	0.0047 – UUSA 0.45 – Centrus 0.1 – GLE
		Operations Chemical Risk	Any potential exposures would be mitigated to minimize the impacts.
Public and Occupational Health – Accidents	**SMALL**	Radiological Accidents	The most significant accident consequences could result in a worker fatality on-site from a criticality, a worker dose of 13 rem,

Table A-3. Uranium Enrichment – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment [(a)]*	*Impact Indicator*	*Key Information [(b)]*
			0.97 rem to the MEI, and a population dose of 12,000-person rem with 7 LCFs. Chances of accident occurrence reduced by application of IROFS. Application of IROFS reduces impacts to SMALL.
		Chemical Accidents	The most significant accident consequences could result in workers exposed to 18,000 mg/m^3 uranium and 6,250 mg/m^3 hydrogen fluoride, with 9.12 mg/m^3 uranium and 3.45 mg/m^3 hydrogen fluoride at controlled area boundary. Chances of accident occurrence reduced by application of IROFS. Application of IROFS reduces impacts to SMALL.
Traffic	**SMALL to MODERATE**	Construction – Daily Vehicle Trips: Workers/Trucks	1,600/28 – UUSA 2,612/20 – Centrus 1,428/70 – GLE
		Operations – Daily Vehicle Trips: Workers/Trucks	500/51 – UUSA 1,100/24 – Centrus 735/6 – GLE
Socioeconomics	**SMALL to LARGE**	Peak Construction Employment (direct)	800 – UUSA 300 – Centrus 280 – GLE
		Operations Employment (direct)	42 – UUSA 120 – Centrus 70 – GLE
		ROI Labor Force	50,358 – UUSA 87,076 – Centrus 204,800 – GLE
Environmental Justice	**No disproportionate and adverse impacts on communities with environmental justice concerns are expected**	Minority or low-income population in ROI	1 minority block group near UUSA. 6 low-income block groups near Centrus. 2 minority and 3 low-income block groups near GLE.

Key: % = percent; BLM VRM = Bureau of Land Management Visual Resources Management; ft = feet; GLE = Global Laser Enrichment; gpd = gallons per day; HALEU = high-assay low-enriched uranium; IROFS = items relied on for safety; LCF = latent cancer fatality; L_{dn} = day-night average sound level; LLW = low-level waste; MEI = maximally exposed individual; mg/m^3 = milligram per cubic meters; MLLW = mixed low-level waste; mrem/yr = millirem per year; MW = megawatt; NAAQS = National Ambient Air Quality Standards; NEPA = National Environmental Policy Act; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; ROI = region of influence; UUSA = Urenco USA

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site.

[b] Details regarding the impacts of operating an existing uranium enrichment facility to support HALEU production were developed from relevant NEPA documentation listed in Section A.3.2.2, *Existing NEPA Documentation* (Leidos, 2023).

[c] The impacts of greenhouse gases are evaluated in EIS Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.3.3.1 Water Resources

Water quality impacts associated with the construction and operation of an enrichment facility at the three sites used to inform this assessment were all SMALL impacts. Ground-disturbing activities associated with land clearing, excavation, and grading could result in temporary increases in soil erosion and sedimentation, which increase turbidity and affect the quality of downstream waters. Generally, low levels of contaminants and the use of BMPs for capturing and treating effluent on-site such as detention or retention basins would be included to prevent process waters from leaving the site. As necessary, National Pollutant Discharge Elimination System (NPDES) permits would be required for authorized discharges during construction or operation to the surface waters near any proposed facility. Stormwater NPDESs permits for construction and operations would be required. BMPs would be employed to limit the impact of stormwater discharges. Construction of the HALEU enrichment facility (based on needed capacity, assumed to be a smaller facility than evaluated in the source documents) would be expected to result in impacts no larger than and most likely smaller than the impacts presented in these documents.

Water use by the HALEU enrichment facility would impact the region water consumption rates that could impact existing water levels, particularly at sites using groundwater as the source of industrial and sanitary water. For instance, at the UUSA site in New Mexico, water levels in the High Plains aquifer have been in decline, and future demand for water in the region is anticipated to exceed the recharge rate. The Lea County Regional Water Plan (RWP), which addresses conservation of regional water supplies for future use, was most recently updated in 2016. The RWP reported that groundwater levels in Lea County are declining at a rate of up to 4 feet per year, with wells in Lea County declining approximately 0.59 feet per year (OSE ISC, 2016). Compliance with the RWP would mitigate the strain that a new facility at this site may place on the groundwater supply and would assist with water conservation in the future decades in which this facility would be operational. As a result of these mitigations, impacts to the municipal water supply system resulting from the addition of a HALEU enrichment facility at this location would be expected to be SMALL to MODERATE. The site-specific environmental impact assessment of construction and operation of a HALEU enrichment facility would address the impact of water consumption on the local water aquifer/water supply.

A.3.3.2 Ecological Resources

The severity of impacts would be dependent on the current ecological conditions of the selected site, in comparison to the disturbance footprint associated with the facility designs.

Wetlands, Federal and state rare, threatened, and endangered species are known to occur at or near the sites used in the assessment of impacts for proposed HALEU enrichment facilities. (The extent of wetlands and the types and number of rare, threatened, and endangered species at a new HALEU enrichment facility would be site specific.) Results of the analyses in the reviewed NEPA documents determined that impacts to ecological resources from the action would be SMALL due to the relatively small area impacted and through implementation of several BMPs on-site. For the Proposed Action, a new analysis—complete with interagency consultations—would be required, as part of the site-specific NEPA documentation prepared by the NRC, to update the inventory of ecological resources on-site and provide a determination of effects.

Construction of a HALEU enrichment facility would likely result in increased erosion, stormwater runoff, and loss of vegetation. Potential impacts on vegetation include decline or mortality of trees near the construction boundary, effects related to hydrologic changes, deposition of dust and other particulate matter, introduction of invasive plant species, and accidental releases of hazardous materials (e.g., fuel spills). Impacts on wildlife from construction on-site would include habitat disturbance, wildlife disturbance, and injury or mortality of wildlife. Habitats within the footprint disturbed by construction would be reduced or altered, and construction activities would result in habitat fragmentation. Although habitats adjacent to the proposed facility site would mostly remain unaffected, wildlife might make less use of these areas due to disturbance (indirect habitat loss). Reduced impacts would result from locating new structures (buildings, cylinder storage areas) in previously developed areas.

Depending upon the site chosen, an official USFWS Information for Planning and Consultation (IPaC) data request would need to be submitted for the project under Section 7 of the Endangered Species Act (16 U.S.C. 1531–1544) to generate an *Official Species List,* and identified if federally designated critical habitats are present. Additional analysis would be required to determine the severity and nature of impacts to federally protected species. Removal of forested habitats would impact vegetation, wildlife, and possibly special status species (defined as those protected under the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and state-listed species). As such, targeted species surveys may be required and interagency coordination could be warranted, including but not limited to: Section 7 consultation with the USFWS's field offices and coordination with the state department of natural resources for state-listed species.

Additionally, migratory birds are protected under the Migratory Bird Treaty Act (16 U.S.C. 703-712). Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d). Again, depending on the site chosen, numerous migratory birds, including some birds of conservation concern and eagles, occur and/or have the potential to occur as transients within the forested areas site. The USFWS recommends conducting tree-clearing activities outside of the bird nesting season to avoid the need for active nest relocation or destruction, when appropriate. To avoid impacts to migratory birds, tree clearing within the land proposed for the new Cylinder Storage Area would need to occur outside of the nesting season (late February through early August). Tree-clearing work during the nesting season would require a migratory bird nest survey 72 hours prior to the start of clearing activities. A permit would be required for the purposeful take of an active migratory bird nest. A permit is not required to destroy migratory bird inactive nests.

The existence of a large number of wetlands at a proposed site, as are present at the Piketon and Wilmington sites, could result in a MODERATE impact to ecological resources. Wetlands and/or water features (such as streams, lakes, ponds, or other waters) are subject to protection under Section 404 of the CWA (33 U.S.C. 1251 et seq.). Wetlands could be impacted by alteration of surface water runoff patterns, soil compaction, or groundwater flow. Pending facility site selection, formal wetland delineation surveys would be required to determine presence or absence of jurisdictional wetlands. Impacts to Federally protected wetlands could require consultation with the U.S. Army Corps of Engineers to obtain a permit. Additionally, subsequent NRC NEPA documentation under these actions may also be required. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

A.3.3.3 Historic and Cultural Resources

Potential historic, cultural, and paleontological resources impacts from construction and operation were analyzed at all three sites used in the assessment of potential impacts of constructing and operating a HALEU enrichment facility. Impacts were categorized as SMALL for all but the GLE site in Wilmington, North Carolina (NRC, 2012b). For the GLE site, the NRC previously identified one historic property within the area of proposed facility construction, which would be avoided during preconstruction and construction activities (NRC, 2012b). Although no construction activities were proposed in the portion of the Wilmington site where historic and cultural resources are known to exist, the GLE (Wilmington) site is located within a region containing high concentrations of historic and cultural resources. Due to potential impacts on undiscovered historic and cultural resources, the NRC determined potential impacts at the proposed GLE site were expected to be SMALL to MODERATE, with license conditions that would require GLE to consider the potential effects on historic and cultural resources from any ground-disturbing activities in unsurveyed areas of the GLE facility site and development of Common Procedure CP-24-201 to address the unanticipated discovery of human remains or artifacts.

A.3.3.4 Noise

Under the Proposed Action, noise impacts associated with construction activities would be short term and limited to the immediate vicinity of the proposed HALEU facility. The level of impact would depend primarily upon the distance from the construction activity to the public.

During operations, noise would be confined primarily to inside buildings. Building facades and distance to public receptors would further reduce public noise impacts. Noise from truck traffic would be expected. As needed BMPs could be utilized to further reduce noise impacts. BMPs to reduce noise-related impacts include the following:

- Maintain equipment in good working order in accordance with manufacturer's specifications.
- Limit noisy activities to the least noise-sensitive times of the day (daytime between 7:00 a.m. and 7:00 p.m.) on weekdays and limit idle time for vehicles and motorized equipment.
- Employ noise-reduction devices (e.g., mufflers) as appropriate.
- Provide a noise complaint process for surrounding communities.

Based on the above discussed analysis and the implementation of BMPs, operational noise impacts at the HALEU enrichment facility (whether at an existing uranium or industrial site or at an undeveloped site) would be expected to be SMALL.

A.3.3.5 Traffic

The three enrichment sites assessed in the evaluation of potential impacts for a HALEU enrichment facility have seen some minor to high increases in traffic volume since the publication of the reference NEPA documentation. At the UUSA site, the AADT volumes on New Mexico Highway 176 and New Mexico Highway 18 near the project site have experienced moderate to high percentage increases in traffic volumes. At the Centrus Piketon site, AADT volumes on U.S. Highway 23 and Ohio Highway 32 have experienced small increases in traffic volumes. At the GLE Wilmington site, the greatest increases in traffic volumes occurred on I-140 and I-40. Based on the most recent AADT data for each site, excess daily volume capacities still remain for these roadways.

Construction Impacts

Impacts to traffic were considered for the construction of the UUSA NEF, the Centrus American Centrifuge Plant (ACP) in Piketon, Ohio, and the GLE facility in Wilmington, North Carolina. These three facilities all would have higher capacities than the 1.1 million SWUs required for the HALEU enrichment facility. (The NEPA documents addressed construction efforts associated with building/adding capacity of between 3.5 million and 6 million SWUs.) Construction and operation of a new co-located HALEU enrichment facility with an estimated capacity of 1.1 million SWUs at these locations would be within the level of impacts determined in relevant NEPA documentation,[7] the 2005 NEF EIS (NRC, 2005a) and 2015 UUSA EA (NRC, 2015) for the UUSA site, the 2006 ACP EIS (NRC, 2006) for the Centrus site, and 2012 GLE EIS (NRC, 2012b) for the GLE Wilmington site.

It was estimated that during construction/expansion of enrichment capacity at the three sites used in this assessment, approximately:

- For any single year, 3,400 truck round trips could occur, resulting in approximately 28 daily vehicle trips for the UUSA facility (NRC, 2005a).
- Up to 2,286 truck round trips (or 20 daily vehicle trips) could occur for any single year of construction at the Centrus Piketon site (NRC, 2006).
- Approximately 35 truck round trips per day (or 70 vehicle trips per day) would be added to the local traffic on average over the construction period at the GLE Wilmington site (NRC, 2012b). Section 4.2.10 of the 2012 GLE EIS noted that a new entrance, an extension of the existing North Entrance to the site off Castle Hayne Road, would be provided for motor vehicle traffic.

However, the majority of new daily vehicle trips generated would result from commuting workers and would have the greatest traffic impacts. The traffic impacts would be most detected during peak commuting hours, especially on the roads directly serving the sites. For the three sites discussed in the assessment, the increase in worker commuter traffic were estimated to be:

- 1,600 daily vehicle trips (or 800 vehicle trips during the peak commuting hours) at the UUSA site (NRC, 2005a)
- 2,612 daily vehicle trips (or 1,306 vehicle trips during the peak commuting hours) at the Centrus Piketon site (NRC, 2006)
- 1,428 daily vehicle trips (or 680 vehicle trips during the peak a.m. commute hour) for peak construction activities at the GLE site (NRC, 2012b)

Operational Impacts

Impacts to traffic were considered for operation of the UUSA NEF, the Centrus ACP in Piketon, Ohio, and the GLE facility in Wilmington, North Carolina. Operation of a new co-located HALEU enrichment facility with an estimated capacity of 1.1 million SWUs at one of these locations would be within the level of impacts determined in the 2005 NEF EIS (NRC, 2005a) and 2015 UUSA EA (NRC, 2015) for the UUSA site, the 2006 ACP EIS (NRC, 2006) for the Centrus site, and 2012 GLE EIS (NRC, 2012b) for the GLE Wilmington site.

It was estimated that during operations at the enrichment facilities at the three sites used in this assessment, approximately:

- 2,900 truck round trips for nonradiological materials and up to 3,200 truck round trips of radiological materials (combined for the original operational level and an expanded operation at

[7] **2005 NEF EIS:** *Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*
2015 UUSA EA: *Environmental Assessment for the Proposed Louisiana Energy Services, URENCO USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico, Docket No. 70-3103*
2006 ACP EIS: *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio*
2012 GLE EIS: *Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina*

7 million SWUs capacity) could occur for any single year, resulting in approximately 24 and 27 daily vehicle trips, respectively, (assuming 250 working days in a year) for the UUSA NEF (NRC, 2005a)

- up to 3,100 truck round trips (or 24 daily vehicle trips) for radiological and nonradiological material could occur for any single year of construction at the Centrus Piketon site (NRC, 2006)
- approximately 2,100 truck round trips per year (6 daily trips) would be added to the local traffic on average during operations at the GLE Wilmington site (NRC, 2012b)

However, the majority of new daily vehicle trips generated would result from commuting workers and would have the greatest traffic impacts. The traffic impacts would be most detected during peak commuting hours, especially on the roads directly serving the sites. For the three sites the increase in worker commuter traffic were estimated to be:

- 258 workers with up to 500 daily vehicle trips at the UUSA NEF site (NRC, 2015)
- 795 workers could generate 1,100 daily vehicle trips (with 199 vehicle trips during the peak commuting hours) at the Centrus Piketon site (NRC, 2006)
- 350 workers would generate 735 daily vehicle trips (with 140 vehicle trips during the peak a.m. commute hour) at the GLE site (NRC, 2012b)

A.3.3.6 Socioeconomics

DOE has adopted the NRC socioeconomic impacts documented in their NEPA evaluation. The NRC defines socioeconomic impacts as follows:

- Employment/economic activity: SMALL is less than (<) 0.1% increase in employment; MODERATE is between 0.1% and 1% increase in employment; and LARGE is defined as greater than (>) 1% increase in employment.
- Population/housing impacts: SMALL is < 0.1% increase in population growth or < 20% of vacant housing units required; MODERATE is between 0.1% and 1% increase in population growth and/or between 20% and 50% of vacant housing units required; and LARGE impacts are defined as > 1% increase in population growth and/or > 50% of vacant housing units required (DOE, 1999).

Therefore, the severity of the economic impacts depends greatly on the current socioeconomic conditions of the site selected for a HALEU enrichment facility. At the UUSA site (Lea County, New Mexico):

- Average increase in workforce of 0.9% (peak increase of 1.8%)
- Increase in local population of 0.02%
- Potential indirect workforce increase of over 1,000 new jobs
- Incoming workers require about 1% of available (vacant rental and home ownership) housing
- Other indirect impacts, including tax revenue and social and health services; MODERATE due to the increase in direct and indirect jobs

At the Centrus site (Piketon, Ohio):

- Average increase in workforce of 1.1%
- Increase in local population of 0.4%
- Indirect impacts (from spending or local purchases), resulting in potential over 1,000 new jobs, a MODERATE impact

- Some public services and tax revenue impacts due to the increase in direct and indirect jobs, SMALL impact
- Potentially MODERATE impacts on healthcare and school services
- Potentially LARGE impacts due to limited housing availability for in-migrating workforce

At the GLE site (Wilmington, North Carolina):

- Given the small number of new employees (92), the economic impact of constructing the proposed facility would be SMALL, but it would be considered a beneficial impact to the economy during the period of construction.

Operation

Based on the existing environmental conditions and the projected number of operational workers (both those residing within the ROI and those moving to the ROI), the estimated socioeconomic impacts of constructing a HALEU enrichment facility at the three sites used to inform the impact analysis would be as follows.

For the UUSA site in Lea County, the increase in workforce would be 0.04%. Even assuming half of workers are new to the ROI, because of the small population increase from proposed operation of the HALEU enrichment facility, all socioeconomic impacts would be SMALL.

For the Centrus site in Piketon, the increase in workforce of 120 plus 190 indirect jobs would be a SMALL increase in the workforce (about 0.3%). However, the number of workers assumed to be new to the area could have a MODERATE to LARGE impact on available housing. The assumed number of workers in-migrating to the area could require about 9% of available (vacant) housing.

For the GLE site in Wilmington, given the small number of new employees, impacts on population, employment, housing, and all other economic indicators would be SMALL. Facility operations would generate additional income in the ROI, along with increases in income and sales taxes; corporate income tax payments also would increase. The economic impact of operating the proposed facility would be SMALL; however, it would be considered a long-term beneficial impact to the economy.

While most socioeconomic indicators show a SMALL impact, each site analyzed has the potential for some of the impacts to be MODERATE.

A.3.3.7 Environmental Justice

The ROI for environmental justice is the area within a 4-mile radius of the enrichment facilities. This ROI was based on NRC guidelines from the Office of Nuclear Material Safety and Safeguards for facilities located outside of city limits or in a rural area. Minority populations were evaluated using the 50% analysis and meaningfully greater analysis for potentially affected block groups within the ROI. If a block group's percentage of minority individuals was greater than 50% or more than 20% of the percentage of the total minority population within the state percentage (block groups were compared to the state percentage in which they were located), then the block group was identified as having a minority population. Similar analysis was also conducted to determine the presence of low-income populations.

UUSA Site – Eunice, New Mexico

The total population of New Mexico is 2,109,366, of which 64.0% would be considered members of a minority population. The total population of nearby Texas is 28,862,581, of which 59.3% would be considered members of a minority population. Of the four block groups within the ROI, one block group has a percentage that would meet the meaningfully greater threshold for minority populations (Census Tract 8, Block Group 2). The UUSA NEF is located within this block group.

The total population of New Mexico for whom poverty is determined is 2,067,620, of which 18.3% would be considered members of a low-income population. The total population of Texas for whom poverty is determined is 28,260,264, of which 14% would be considered members of a low-income population. None of the block groups, of the four block groups within the ROI, have percentages that would meet the threshold for low-income populations.

The construction and operation of the enrichment facility would have a SMALL impact on communities with environmental justice concerns. The study further concluded that no disproportionate and adverse impacts from construction, operation, or decommissioning would occur to communities with environmental justice concerns living near the UUSA site or along the transportation routes into and out of the facility.

Centrus Site – Piketon, Ohio

The total population of Ohio is 11,769,923, of which 22.2% would be considered members of a minority population. No block groups meet the thresholds for minority populations.

The total population for whom poverty is determined in Ohio is 11,451,346, of which 13.4% would be considered as low income. Six block groups of the nine block groups within the ROI have met the threshold for low-income populations.

The construction and operation of the enrichment facility would have up to MODERATE impacts on communities with environmental justice concerns to accommodate limited housing availability to in-migrating workforce. Although there are low-income populations located within the ROI, no disproportionate and adverse impacts on these populations are anticipated during construction or operation of enrichment facilities at the Centrus location.

GLE Site – Wilmington, North Carolina

The total population of North Carolina is 10,367,022, of which 37.9% would be considered members of a minority population. Two block groups of the 14 block groups within the ROI meet the meaningfully greater threshold for minority populations.

The total population for whom poverty is determined in North Carolina is 10,092,759, of which 13.7% would be considered as low income. Three block groups of the 14 block groups within the ROI have met the threshold for low-income populations.

Preconstruction, construction, operation, and decommissioning of the proposed GLE facility would likely have SMALL to MODERATE impacts based on other resource area impacts, but would not be expected to result in disproportionate and adverse impacts on communities with environmental justice concerns.

New Facility

Site selection for a new HALEU enrichment facility is expected to include criteria related to environmental, socioeconomic, and environmental justice factors. Impacts on communities with environmental justice concerns would be dependent on local and regional conditions for a proposed site, the potential for adverse effects, and the presence of communities with environmental justice concerns in the ROI. Based on similar facilities and the application of siting criteria, impacts are expected to be in the SMALL to MODERATE range. Site-specific analysis would be required to determine disproportionate and adverse impacts.

A.4 HALEU Deconversion

A.4.1 Introduction

HALEU deconversion would occur after the HALEU enrichment process. The HALEU deconversion facility could produce uranium oxide, uranium metal, or other more exotic forms of HALEU. The processes for deconversion of UF_6 to oxide or metal are well-understood technologies and performed routinely for LEU and DU. Because information is lacking regarding construction and operation of deconversion facilities that could produce other forms of HALEU that may be required for some advanced reactor fuels, this HALEU EIS concentrates on deconversion to uranium oxide and uranium metal. Construction and operation of a HALEU deconversion facility that would produce other unique forms of HALEU would be expected to have similar impacts. Regardless, project-specific NEPA documentation would be completed by the NRC before construction and operation of any new deconversion facility.

There is currently no deconversion facility in the United States capable of producing HALEU in the quantities required by the Proposed Action. A facility would need to be constructed. The facility would convert commercially generated HALEU from UF_6 into uranium oxide or metal and fluorine byproducts. The deconversion facility could be co-located with an enrichment facility, co-located with a fuel fabrication facility, or be located as a standalone facility. In addition, a HALEU storage facility could be co-located with the HALEU deconversion facility. A deconversion facility could be sited anywhere in the United States that meets NRC siting requirements. The facility would have to be an NRC Category II facility.

A.4.2 Analysis Methodology

A.4.2.1 Approach to NEPA Analyses

The environmental consequences from construction and operation of a HALEU deconversion facility are expected to be similar to those for an LEU or DU deconversion facility. This HALEU EIS incorporates by reference resource conditions and impact considerations of the primary existing NEPA documentation listed in Section A.4.2.2, *Existing NEPA Documentation*, as well as other available information such as new census data. The analysis also considers comments provided by interested parties during the scoping period.

The intent of the HALEU EIS is to provide a range of potential impacts that could occur for construction and operation of a HALEU deconversion facility using existing NEPA documentation and other available sources, incorporating by reference and summarizing wherever possible. Fundamental to the approach is the relationship of the production throughput for the DU deconversion facilities with existing NEPA documentation (ranging from 3,400 MT to 18,000 MT of depleted uranium hexafluoride [DUF_6] per year) and the required throughput for the HALEU deconversion facility (38 MT of HALEU in the form of UF_6 per year). Minor differences (e.g., equipment/processing batch sizes, administrative controls) in facility design and operation, primarily to address criticality control needed for HALEU but not DUF_6, should not impact environmental impacts associated with the facility. Private industry, along with NRC approvals, would determine the actual technique employed.

A.4.2.2 Existing NEPA Documentation

DOE reviewed the NRC's Fluorine/DU EIS (NRC, 2012a) (referred to as the IIFP facility). The Fluorine/DU EIS provides DOE with information and analyses for determining the impacts of construction and operation of a HALEU deconversion facility.

DOE also considered information contained in DOE's *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site (DOE/EIS-0360)* (DOE, 2004c) (referred to as the "Portsmouth DU EIS") and *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site (DOE/EIS-0359)* (DOE, 2004b) (referred to as the "Paducah DU EIS"). DOE is using these currently operating facilities to convert its inventory of DUF_6 to DU oxide and other compounds suitable for beneficial use or disposal. These EISs analyzed the construction, operation, and decontamination and decommissioning of the DUF_6 deconversion facilities at the Portsmouth and Paducah sites; transportation of DU deconversion products and waste materials to a disposal facility; transportation and sale of the hydrogen fluoride (HF) produced as a deconversion co-product; and neutralization of HF to calcium fluoride and its sale or disposal in the event that the HF product is not sold.

A.4.3 Potential Environmental Consequences

This section summarizes the environmental consequences information from NEPA documents for the IIFP facility (NRC, 2012a), the Portsmouth DUF_6 conversion facility (DOE, 2004b), and the Paducah DUF_6 conversion facility (DOE, 2004c). For comparison, the IIFP facility would be able to process 3,400 MT of DUF_6 per year, the Portsmouth DUF_6 conversion facility can process 13,500 MT of DUF_6 per year, and the Paducah DUF_6 conversion facility can process 18,000 MT of DUF_6 per year. The HALEU deconversion facility addresses a facility that could process 38 MT/yr of HALEU in the form of UF_6 and produce 28 MT/yr of HALEU in the form of an oxide or 25 MT/yr of HALEU in the form of metal. Therefore, many of the attributes of the DUF_6 conversion facilities would be much larger than needed for the HALEU deconversion facility and would likely bound the impacts of construction and operation of a HALEU deconversion facility.

DOE has analyzed construction and operation of a HALEU deconversion facility based on available data for the DUF_6 conversion facilities. Most attributes of the HALEU deconversion facility are expected to be bounded by this analysis. In any event, additional project-specific NEPA documentation would be completed by the NRC before construction and operation of a HALEU deconversion facility.

The Proposed Action's impact assessments for enrichment are presented in Table A-4 below. After the table, see Section A.4.3.1, *Ecological Resources*, through Section A.4.3.4, *Socioeconomics*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding a deconversion facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.4.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-4 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences between the IIFP, Paducah, and Portsmouth facilities are noted.

Table A-4. Uranium Deconversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Land Use	**SMALL**	Land Disturbed (acres)	40 – IIFP 45 – Paducah 65 – Portsmouth
		Total Site Size (acres)	640 – IIFP

Table A-4. Uranium Deconversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment*** [(a)]	***Impact Indicator***	***Key Information*** [(b)]
			3,556 – Paducah 3,714 – Portsmouth
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL**	Tallest Substantial Structure (other than met/T-line towers) (feet)	100 – IIFP
		Distance to Nearest Receptor (miles)	1.6 – IIFP 0.8 – Paducah 0.6 – Portsmouth
		BLM VRM Rating	Class IV
Geology and Soils	**SMALL**	Rock and Soil Excavated	42,400 cubic yards – IIFP Small amounts of soil excavated at Paducah and Portsmouth
		Backfill Needed	200 cubic yards – IIFP Small amounts of backfill needed at Paducah and Portsmouth
Water Resources	**SMALL**	Effluent Discharge	Stormwater runoff, treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	3,024 to 4,464 – IIFP 109,589 – Paducah 93,425 – Portsmouth
		Floodplains	Floodplains exist within the vicinity of the Portsmouth facility, but outside the perimeter road in which facilities are located.
Air Quality [(c)]	**SMALL to MODERATE** SMALL with effective implementation of fugitive dust control measures	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Emissions from vehicles, equipment, and fugitive dust. Exceedance of PM_{10} and $PM_{2.5}$ NAAQS for Paducah and Portsmouth would be mitigated with the implementation of fugitive dust controls.
		Operations emissions	Exceedances of $PM_{2.5}$ NAAQS for Portsmouth. Emission controls and regulatory compliance required by a state permit and the NRC would limit emissions to acceptable levels.

Table A-4. Uranium Deconversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment [(a)]***	***Impact Indicator***	***Key Information [(b)]***
Ecological Resources	**SMALL**	Impacts to vegetation, wildlife, wetlands, or special status species	SMALL – IIFP SMALL – Paducah site SMALL – Portsmouth site
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP property potentially disturbed or impacted	No – IIFP Yes – Paducah and Portsmouth
		Potential for impacts on Traditional Cultural Property (TCP)	None identified for IIFP, Paducah, and Portsmouth
Infrastructure	**SMALL to MODERATE**	Electrical Use	37,269 MWh per year Paducah
		Water Use	See Water Resources
		Fuel Use	3,000 to 4,000 gpy liquid fuel and 40 to 44 million cubic ft of natural gas for Paducah and Portsmouth
Noise	**SMALL**	Distance to Off-Site Receptor (miles)	1.6 – IIFP 0.8 – Paducah 0.6 – Portsmouth
		Noise Levels	Below EPA guideline of 55 dBA as L_{dn} for residential zones for IIFP, Paducah, and Portsmouth
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique or problematic waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL**	Occupational Risk	6 to 11 worker injuries and no fatalities expected for construction. 142 to 197 worker injuries and no fatalities expected for operations.
		Construction Radiological Impacts (mrem/yr)	Worker: 0 – IIFP 35 to 40 – Paducah 89 – Portsmouth No impacts to the public.
		Operations Average Worker Dose (mrem/yr)	75 – IIFP, Paducah, and Portsmouth
		Operations MEI Public Dose (mrem/yr)	0.002 – IIFP 2.1×10^{-5} – Paducah and Portsmouth
		Operations Population Dose (person-rem/yr)	0.04 – IIFP 4.7×10^{-5} – Paducah 6.2×10^{-5} – Portsmouth

Table A-4. Uranium Deconversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment [(a)]***	***Impact Indicator***	***Key Information [(b)]***
		Operations Chemical Risk	Uranium and fluorine are the primary chemical hazards. No worker or public health impacts from chemicals are expected.
Public and Occupational Health – Accidents	**SMALL**	Radiological Accidents	The most significant accident consequences could result in a worker fatality on-site from a criticality, 0.57 rem to the MEI, and 451 person-rem to the public. Worst-case UF_6 release – 686 rem to worker inside room. Cylinder fire – 11.7 rem to MEI and 34 person-rem to general public Chances of accident occurrence reduced by application of IROFS. Application of IROFS reduces impacts to SMALL.
		Chemical Accidents	The most significant accident consequences (cylinder fire) could result in 680 members of the public and 1,000 noninvolved workers experiencing adverse effects from hydrogen fluoride. For a worst-case UF_6 release, a worker outside of building and exposed for 10 minutes could be exposed to 16,000 mg/m^3 hydrogen fluoride. Chances of accident occurrence reduced by application of IROFS. Application of IROFS reduces impacts to SMALL.
Traffic	**SMALL**	Construction – Daily Vehicle Trips: Workers/Trucks	280/40 – IIFP 380 – Paducah and Portsmouth
		Operations – Daily Vehicle Trips: Workers/Trucks	280/20 – IIFP 320 – Paducah and Portsmouth
Socioeconomics	**SMALL to MODERATE**	Peak Construction Employment (direct)	140 – IIFP 190 – Paducah and Portsmouth
		Operations Employment (direct)	140 – IIFP 160 – Paducah and Portsmouth
Environmental Justice	**No disproportionate and adverse impacts on communities with environmental justice concerns are expected**	Minority or low-income population in ROI	Nearest community with environmental justice concerns is 14 miles from IIFP. Communities with environmental justice concerns are within 50 miles of Paducah and Portsmouth.

Table A-4. Uranium Deconversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	HALEU Activity Impact Assessment [(a)]	Impact Indicator	Key Information [(b)]

Key: BLM VRM = Bureau of Land Management Visual Resources Management; dBA = A-weighted decibels; EPA = U.S. Environmental Protection Agency; ft = feet; gpd = gallons per day; gpy = gallons per year; HALEU = high-assay low-enriched uranium; IIFP = International Isotopes Fluorine Products; IROFS = items relied on for safety; L_{dn} = day-night average sound level; LLW = low-level waste; mg/m^3 = milligram per cubic meters; MEI = maximally exposed individual; MLLW = mixed low-level waste; mrem/yr = millirem per year; MWh = megawatt hour; NAAQS = National Ambient Air Quality Standards; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter (fine particulates); PM_{10} = particulate matter less than or equal to 10 microns in diameter (coarse particulates); Ports = Portsmouth Plant; ROI = region of influence; UF_6 = uranium hexafluoride

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site.

[b] Details regarding the impacts of operating an existing uranium deconversion facility to support HALEU production were developed from relevant NEPA documentation listed in Section A.4.2.2, *Existing NEPA Documentation* (Leidos, 2023).

[c] The impacts of greenhouse gases are evaluated in EIS Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.4.3.1 Ecological Resources

The severity of impacts will be dependent on the current ecological conditions of the selected site, in comparison to the disturbance footprint associated with the facility designs.

It is assumed that activities associated with a construction of a new HALEU deconversion facility at any of the proposed existing industrial sites would occur entirely within the previously developed and disturbed areas. Impacts to ecological resources would be SMALL if new construction were to occur entirely within previously developed and disturbed lands, as these areas are subject to frequent disturbance from human activity, grounds maintenance, or disruptions from ongoing facility operations, and native habitats are no longer present or have likely degraded overtime. Previously developed and disturbed areas are not likely to support habitat for wildlife other than for those species adapted to human disturbance (such as transient small mammals, insects, and birds).

Any new construction occurring within undeveloped lands could have SMALL or MODERATE impacts on ecological resources depending on the resources disturbed and the mitigation and minimization measures employed. Land-clearing activities as part of new construction would likely result in increased erosion, stormwater runoff, and loss of vegetation. Additionally, impacts on wildlife could include habitat fragmentation, disturbance, and injury or mortality—as habitats within the footprint disturbed by construction could be reduced or altered. Loss of habitat could result in a long-term reduction in wildlife abundance and diversity. Habitat disturbance could facilitate introduction, or the spread, of invasive plant species. Wildlife habitat could be adversely affected if invasive vegetation became established in the disturbed areas and adjacent off-site habitats. Construction activities could cause wildlife disturbance, including interference with behavioral activities. Wildlife could respond in various ways, including attraction, habituation, and avoidance. Principal sources of noise would include vehicle traffic and operation of machinery. Regular or periodic noise could cause adjacent areas to be less attractive to wildlife and result in reduced usage. Construction activities could result in the direct injury or death of certain wildlife species. Wildlife could also be exposed to accidental fuel spills or releases of other hazardous materials. Construction at a previously developed site would minimize these impacts to wildlife.

Pending the deconversion facility site selection, an official USFWS IPaC data request would need to be submitted for the project under Section 7 of the Endangered Species Act to generate an *Official Species List* and identify if federally critical habitats are present. Additional analysis would be required to determine the severity and nature of impacts to the protected species as part of the final design and description of the Proposed Action. Removal of native habitats would impact vegetation, wildlife, and possibly special status species. Special status species are defined as those protected under the Endangered Species Act, the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and state-listed species.

Migratory birds are protected under the Migratory Bird Treaty Act (16 U.S.C. 703–712). Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d). Numerous migratory birds, including some birds of conservation concern and eagles, likely occur or have the potential to occur as transients throughout the vicinity of the proposed facility sites. The USFWS recommends conducting tree-clearing activities outside of the bird nesting season to avoid the need for active nest relocation or destruction, when appropriate. To avoid impacts to migratory birds, tree clearing within undeveloped lands would need to occur outside of the nesting season (late February through early August). Tree-clearing work during the nesting season would require a migratory bird nest survey 72 hours prior to the start of clearing activities.

Wetlands and/or water features (such as streams, lakes, ponds, or other waters) subject to protection under Section 404 of the CWA (33 U.S.C. 1251 et seq.) could occur from a deconversion facility related to the Proposed Action. Wetlands could be impacted by alteration of surface water runoff patterns, soil compaction, or groundwater flow. Pending facility site selection, the USFWS's National Wetlands Inventory database would need to be accessed to identify the presence of wetlands or water features subject to protection under Section 404 of the CWA (33 U.S.C. 1251 et seq.) that could occur from a deconversion facility related to the Proposed Action. Impacts to federally protected wetlands would require consultation with the U.S. Army Corps of Engineers to obtain a permit. Additionally, subsequent NEPA analysis under these actions may also be required. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

A.4.3.2 Historic and Cultural Resources

At the IIFP conversion facility, the NRC determined that construction and operation of the proposed facility would not adversely affect historic resources or other cultural resources and defined the potential impacts as SMALL (NRC, 2012a). At the Portsmouth and Paducah sites for the DUF_6 conversion facilities, DOE determined that impacts on cultural resources could occur if ground disturbance resulted in the discovery of previously unrecorded cultural resources that, once evaluated, were determined to be eligible for listing on the NRHP. Operation of a HALEU deconversion facility would not be anticipated to impact cultural resources. In general, construction and operation of a HALEU deconversion facility at an existing uranium fuel cycle facility or industrial site on previously disturbed land, would likely result in SMALL impacts.

Because a site has not been selected for development of a HALEU deconversion facility, the focus of this analysis is on potential impacts, siting considerations, and requirements associated with development of a HALEU deconversion facility that would need to be considered. Site-specific analysis of potential impacts to cultural resources is expected to be undertaken by the NRC when it conducts NEPA analysis once a site has been selected and a design developed.

The Area of Potential Effects for development of a HALEU deconversion facility includes the footprint of the proposed facility construction and any associated infrastructure improvements, such as road construction, where archaeological sites could be disturbed, and an as-yet-undefined area around the new facility where it would be visible and potentially affect the setting of any nearby NRHP-listed or -eligible properties.

Construction activities that may impact cultural resources include but are not limited to ground-disturbing activities, including land clearing, earth moving, excavation, and vehicle and equipment operation on unpaved surfaces. These activities may result in visual and physical disturbance of any surface or subsurface archaeological resources listed on or eligible for listing in the NRHP, where present. Operation of a deconversion facility would not be anticipated to impact cultural resources.

The amount of land clearance and earth moving required would be dependent upon the type and size of the facility, as well as the need for any additional or ancillary infrastructure (such as parking). Generally, the amount of land clearing and total ground disturbance would be associated with the characteristics of the site chosen for the HALEU deconversion facility, in conjunction with the type and size of the facility. Siting a HALEU deconversion facility in previously undeveloped locations would require more ground disturbance of previously undisturbed areas, with greater potential for the presence of intact archaeological resources, than would placement of a facility in an area that is already developed or improved. Constructing a new facility within a previously developed or improved area would not be expected to result in significant impacts to archaeological resources as prior development of these areas typically has already impacted any sites that may have been present. Clearing of undeveloped areas for facility development would have a higher potential to result in adverse effects to archaeological resources; however, the degree of the impact would be dependent on the significance (NRHP eligibility) of the site(s) present. This could result in SMALL to MODERATE impacts.

Development of any type of facility also presents the potential for introduction of a visual intrusion into the setting of nearby NRHP-listed or -eligible properties, if there are any within the viewshed of the new facility. Construction of a new facility in proximity to NRHP-listed or -eligible properties could alter characteristics of their surrounding environment (or setting), and adverse effects could result if that setting contributes to the importance of the historic property. Adverse effects would also result if the new facility, through its design or scale, introduced visual elements that are out of character for the period the historic property represents. The degree of the impact would be dependent on multiple factors, including how visible the new facility will be to any NRHP-listed or -eligible properties, which in turn is a function of how close it is and whether there are any intervening obstructions, the size and design of the new facility, and the integrity of the historic setting in which the new facility would be built. This could result in SMALL to MODERATE impacts.

A.4.3.3 Infrastructure

The infrastructure impacts analysis relies on analyses conducted in the Fluorine/DU EIS that would allow IIFP to construct and operate a fluorine extraction process and DU deconversion plant (NRC, 2012a). Although, the Fluorine/DU EIS did not assess impacts to infrastructure, the document did explain the utilities needed and the demands of a deconversion facility. The infrastructure and utilities needed for construction and operation of a proposed deconversion facility at any of the candidate sites under consideration include electrical power, water, natural gas, steam, compressed air, and nitrogen.

Since the HALEU deconversion facility fuel throughput would be substantially smaller than the throughput evaluated in the Fluorine/DU EIS, the associated demand on infrastructure during HALEU deconversion would also be smaller than that considered in the Fluorine/DU EIS (NRC, 2012a). Construction of a new HALEU deconversion facility would require extension of existing utility service to accommodate new structures and to support operations of the proposed deconversion facilities. However, any needed infrastructure improvements or installation of additional utilities would comply with all applicable permits, service agreements, and regulatory requirements. As such, and with implementation of standard BMPs to further reduce or avoid potential impacts, SMALL impacts to infrastructure would be anticipated from construction and operation of the proposed deconversion activity at any of the candidate sites.

Site selection for a new HALEU deconversion facility is expected to include criteria for adequate utility capacity and infrastructure. These criteria are expected to include the requirement for sufficient capacity to meet the anticipated initial and projected future utility needs of the HALEU deconversion facility without disrupting service to other customers during construction or operation. Impacts for siting the facility in industrial areas would be SMALL as these areas are expected to have existing utility infrastructure and capacity. Impacts could be greater for undeveloped sites and considered MODERATE, as additional utility infrastructure would likely be required. Installation of such infrastructure would result in a greater area of ground disturbance and may adversely affect utility service to existing customers. Allocating available utility capacity for the HALEU deconversion facility could limit utility capacity available for future needs. With the use of siting criteria, these impacts would likely to range from SMALL to MODERATE for undeveloped sites.

A.4.3.4 Socioeconomics

Given the small workforce requirements and resulting population influx associated with both construction (28 workers) and operation (28 workers) activities, the NRC concluded that the potential impacts within the ROI from the IIFP facility would be minimal, representing a 0.06% increase in the ROI population in 2010 (and also in 2020). The impacts on employment, housing inventories or vacancies, schools, and public services were considered SMALL.

Therefore, given the small in-migrating population expected to move into the area, and the fact that all the potential sites are well-established industrial sites the socioeconomic impacts associated with a HALEU deconversion facility would be expected to be SMALL in the ROI. In addition, the economic impacts (e.g., increased jobs, income, and tax revenues) would be considered beneficial to the local and regional economy. In the event a larger (than analyzed) workforce moved into the ROI and a majority of workers chose to reside in the host county, particularly at one of the sites where the host county is more rural in nature and has lower population numbers (and a low population density), the potential impacts may be SMALL to MODERATE, as the higher numbers could adversely affect housing availability and community services such as education, fire protection, law enforcement, and medical resources. At the same time, however, the corresponding increases in income, spending, and tax revenues that would result from a larger workforce, would help benefit the local economy.

A.5 HALEU Storage

A.5.1 Introduction

As part of the Proposed Action, HALEU could be stored in multiple forms. HALEU in the form of UF_6 could be stored at the enrichment facility used to enrich the uranium to 19.75%. HALEU could also be stored in various forms (metal, uranium dioxide [UO_2], or other forms) at the deconversion facility. As noted in the previous section, the deconversion facility could be co-located with an enrichment or fuel fabrication facility or independently sited at another industrial facility or facilities, or an undeveloped site or sites. The storage facility could be as simple as a concrete or gravel pad (typically used for the storage of LEU form of UF_6 and DUF_6 at enrichment facilities currently producing enriched LEU for commercial nuclear reactors). An enclosed structure could also serve as a storage facility. If an enclosed structure were to be used, the storage facility would be a relatively simple structure, with the only operational actions being the receipt, unloading, storage, periodic inspection, loading, and shipping out of the containers of HALEU material.

A.5.2 Analysis Methodology

A.5.2.1 Approach to NEPA Analyses

Activity data developed for use in the analysis of new storage facilities is conservatively based on the assumption that the facilities would store the material that requires the most space, which is UO_2. The project annual and total storage demands for HALEU are 50 and 290 MT of metal, or 56 and 330 MT in the form of UO_2, respectively. DOE has assumed at least two storage facilities would be needed at separation locations. Therefore, based on the number of containers needed to house one half of the total storage demand, or 165 MT of UO_2, the preliminary size of a storage facility is about 12,000 square feet with an assumed height of 25 feet (see below for further details). The design would meet the NRC criteria for the storage of HALEU (such as seismic capability, tornado protection, etc.) and would include the necessary environmental controls to protect staff and the environment. The storage facility would be an NRC Category II facility, with security features meeting NRC requirements for the possession of uranium enriched to between 10% and 20% U-235.

Construction

The following presents design and activity data estimated for construction of a new HALEU storage facility at a generic industrial site (DOE, 2023a).

The ES-3100 package design was chosen as a surrogate package design for storing UO_2 as it satisfies the safety standards needed for HALEU (NRC, 2021b). Use of the ES-3100 package would require the largest HALEU storage facility and therefore represents the most conservative scenario to evaluate potential construction impacts. The ES-3100 package is a cylindrical container that is about 43 inches in height and 19 inches in diameter and is composed of an outer drum assembly and an inner containment vessel. The purpose of the ES-3100 is to transport bulk high-enriched uranium in various forms. It is assumed that each package would include a containment vessel that would hold about 28 kilograms of UO_2 (INL, 2019). Based on the total storage demand of 165 MT of UO_2, the facility would house 5,893 containers. Assuming there are four containers per pallet (4 feet x 4 feet), stacked three pallets high, this design would result in a footprint of about 7,900 square feet. Considering about 50% of additional floor space is assumed to be needed for the operation of container handling equipment, the final building footprint would be about 12,000 square feet with an assumed height of 25 feet.

The building walls would have precast concrete panels topped with metal exterior siding and roof. The floor would be made of solid reinforced concrete 7 inches thick to handle the expected weight of the stacked storage packages. The facility also would include an associated approach pad constructed of reinforced concrete with a dimension of 40 feet x 30 feet and 12 inches thick to handle the expected weight of the delivery trucks.

Additional construction metrics include the following:

- It is assumed construction would occur in previously disturbed areas of a site.
- The site is level, but excavation would be required for the building slab and approach pad. Construction would disturb 1 acre of land.
- Foundation excavation would require the removal of 295 cubic yards of earth. Excavated soils would be stockpiled on-site and reused for grading post-concrete slab construction.
- Subbase gravel installation would require 363 tons of material at 6 inches thick and would be delivered in 17 truckloads, based on 22 tons per truck.
- The total concrete volume for the building slab and approach pad would amount to 334 cubic yards, which would be delivered by 31 concrete trucks with capacities of 11 cubic yards.
- The building slab and approach pad would require the installation of 520 feet of form material and 11,000 lbs of reinforcement steel bar (rebar), which would be delivered in a total of 2 truckloads.
- Building construction would require 4,600 square feet of 8-inch precast wall panels, 12,000 square feet of 26-gauge galvanized steel panels, and structural steel members, which would be delivered in a total of 8 truckloads.
- Cement and gravel would originate from local sources at a distance of 10 miles.
- Concrete forms would be rented and would be returned to the supplier (no waste).
- The concrete pour would generate up to 10 cubic yards of municipal waste. Two truck loads of construction waste would be delivered to a nearby landfill.

Construction of the storage facility would take approximately 55 days with a duration-weighted average of 15 personnel and a peak workforce of 30 personnel.

A summary of the construction metrics is shown in Table A-5.

Table A-5. Summary of Estimates for Construction of the HALEU Storage Facility

Subtask	***Duration (day)***	***Personnel***	***Equipment***	***Material***	***Material Truck Round Trips***
Earthwork and subbase	6	9	Excavation – CAT D3 Small Dozer, CAT D3 tracked skid steer, CAT 308 Excavator, CAT 60-inch compactor, 2 dump trucks Subbase – CAT D3 Small Dozer, 2 dump trucks	363 tons #57 stone	17
Concrete pad formwork and rebar install	8	13	2 support trucks, 1 long-reach forklift	520 ft of form material and 11,000 lbs #4 rebar	2
Concrete pad pour	1	17	1 concrete pumper, 2 ride-on trowels, 5 concrete trucks (11 cubic yards), 2 support trucks	334 cubic yards 5,000 psi concrete	31

Table A-5. Summary of Estimates for Construction of the HALEU Storage Facility

Subtask	*Duration (day)*	*Personnel*	*Equipment*	*Material*	*Material Truck Round Trips*
Building construction – install precast concrete panel walls/metal structure	20/10	7/7	3 support trucks, 1 boom crane	4,600 square feet of 8-inch precast wall panels (46,000 lbs). 12,000 square feet of 26-gauge galvanized steel wall panels (12,000 lbs) and structural steel members (220,000 lbs)	8

Source: www.cat.com

Key: CAT = Caterpillar Inc.; ft = feet; HALEU = high-assay low-enriched uranium; lbs = pounds; psi = pounds per square inch

Operation

Operations at a storage facility would include (1) receipt and shipment of HALEU containers by truck, (2) handling of HALEU containers with industrial equipment such as forklifts, and (3) monitoring and inspection of stored HALEU containers. Security could be provided for the facility itself or by existing security of the site location. The following are assumptions for activity data for the operation of each new storage facility.

- The annual and total storage demands for UO_2 are 28 and 165 MT, respectively. The annual and total round trips associated with receipt and shipment of this material, assuming trucks would be fully loaded with material, would be 8 and 47, respectively. Annual round trip mileages generated by receipt and shipment trips 47,600 miles (38,288 one-way kilometers) (Leidos, 2023).
- HALEU containers would be handled by an electric forklift with a rated lift capacity of at least 5,000 lbs to handle a loaded pallet weighing about 2,000 lbs.
- The facility is assumed to house one diesel-powered electric generator (about 200 horsepower) for use in the event of power outages. Otherwise, the generator would operate 1 hour per month for routine maintenance testing.
- Two personnel are assumed to staff the facility 24 hours per day and 365 days per year. Assume 2,190 worker commuter round trips per year (2 employees x 3 shifts per day x 365 days per year) for 6 years.

Affected environment and construction impacts information for the potential enrichment, deconversion, and fuel fabrication facility locations were obtained from the applicable NEPA documents cited in Section A.5.2.2, *Existing NEPA Documentation*, and Appendix B, *Facility NEPA Documentation*.

This section evaluates the construction and operation of one storage facility that is sized to store half of the total amount of HALEU produced under the Proposed Action. Therefore, at least two storage facilities would be required to store the entire amount of HALEU produced. HALEU storage facilities could also be constructed and operated that store less than half the total amount. The impacts of construction and operation of these smaller storage facilities would be bounded by the impacts presented in this section.

Each storage facility could continue to operate in some capacity or could be repurposed for other uses after completion of the Proposed Action. Due to the speculative nature of the future use of the storage facility/facilities, decommissioning of a storage facility is not analyzed in this HALEU EIS, but would be expected to be evaluated in the NEPA analysis by the NRC for the siting/design of any HALEU storage facility.

A.5.2.2 Existing NEPA Documentation

NEPA coverage specifically addressing the construction and operation of a new HALEU storage facility does not exist. However, several NEPA documents are relevant to the current analysis. The following five NEPA documents evaluate building construction at potential locations for a HALEU storage facility and include example affected environment and impact analyses information used in developing this HALEU EIS:

- ***Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio*** (NRC, 2006)

  The NRC issued an EIS (NUREG-1834) for the American Centrifuge Plant (ACP) in 2006 (NRC, 2006) (referred to as the "2006 ACP EIS"). In April 2007, a 30-year license (license SNM-2011) was issued to USEC (now Centrus) to construct, operate, and decommission the Centrus ACP, a commercial-scale gas centrifuge uranium enrichment facility. The license is held by American Centrifuge Operating, a subsidiary of Centrus. In 2011, DOE adopted the 2006 ACP EIS (NRC, 2006) and issued DOE/EIS-0468 (DOE, 2011). The NRC's 2006 ACP EIS, adopted in 2011 by DOE, includes dimensions of buildings proposed for construction and analyses of construction and operation impacts.

- ***Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina*** (NRC, 2012b) (the "GLE EIS")

  The GLE EIS does not disclose dimensions of buildings proposed for construction, as it states they are considered proprietary and contain security-related information. However, it provides analyses of construction and operation impacts.

- ***Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*** (NRC, 2005a) (the "2005 NEF EIS")

  The 2005 NEF EIS proposes many construction activities and discloses metrics for site areas and earth moving, but no building dimensions. However, it provides analyses of construction and operation impacts.

- ***Environmental Impact Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico*** (NRC, 2012a) (the "Fluorine/DU EIS")

  The Fluorine/DU EIS proposes many construction activities but does not disclose metrics for building dimensions. However, it provides analyses of construction and operation impacts.

- ***Environmental Assessment Related to the Renewal of NRC License No. SNM-42 for BWX Technologies, Inc. (BWXT)*** (NRC, 2005b) (the "BWXT EA")

  For BWX Technologies, Inc. (BWXT), the NRC completed an EA and Finding of No Significant Impact for renewing Materials License SNM-42 for the BWXT facility in Lynchburg, Virginia.

A.5.3 Potential Environmental Consequences

The environmental consequences associated with the construction and operation of a single storage facility with a capacity of 145 MT of HALEU to support the commercialization of the HALEU fuel cycle are presented here. As described in this section, it is expected that operations would minimally impact all resources. Placing a HALEU storage facility in an existing uranium fuel cycle facility would represent the lower end of potential project construction impacts and locating a HALEU storage facility at an undeveloped (greenfield) site would likely result in the highest construction impacts for some resources. Siting a HALEU storage facility at an unknown location would have to take into consideration site-specific environmental conditions and comply with the applicable regulatory requirements at that location.

Site selection is not addressed in this EIS; specific site impacts would be addressed in subsequent site-specific NEPA documentation. Since the storage facility would be a commercial facility licensed by the NRC, site-specific NEPA documentation would be the responsibility of the individual licensee and the NRC.

The Proposed Action's potential environmental consequences impact assessments for HALEU storage are presented in Table A-6 below. After the table, see Section A.5.3.1, *Ecological Resources*, and Section A.5.3.2, *Historic and Cultural Resources*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding a storage facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.5.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-6 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences between various facilities are noted.

Table A-6. HALEU Storage – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Land Use	**SMALL**	Land Disturbed (acres)	1
		Total Site Size (acres)	See enrichment and deconversion (same sites under consideration for this activity).
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL**	Tallest Substantial Structure (other than met/T-line towers) (feet)	25 – storage building
		Distance to Nearest Receptor (miles)	See enrichment and deconversion
		BLM VRM Rating	See enrichment and deconversion
Geology and Soils	**SMALL**	Rock and Soil Excavated	Minimal excavation needed
		Backfill Needed	Minimal backfill needed
Water Resources	**SMALL**	Effluent Discharge	Minor stormwater runoff from 1 acre site. No process effluent.

Table A-6. HALEU Storage – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
		Average Operational Water Use (gpd)	Minor amounts to support 6 personnel
		Floodplains	See enrichment and deconversion
Air Quality [(c)]	**SMALL**	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Emissions from vehicles, equipment, and fugitive dust. Potential $PM_{2.5}$ impacts would be mitigated to below NAAQS levels with the implementation of fugitive dust controls.
		Operations emissions	Emissions from vehicles and equipment. Minimal emissions would not contribute to an exceedance of a NAAQS.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	None – UUSA SMALL – Centrus /Portsmouth SMALL to MODERATE – GLE SMALL – IIFP SMALL – Paducah
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP property potentially disturbed or impacted	See enrichment and deconversion
		Potential for impacts on Traditional Cultural Property (TCP)	See enrichment and deconversion
Infrastructure	**SMALL to MODERATE**	Electrical Use	Minor amounts for building lighting and HVAC
		Water Use	See Water Resources row
		Fuel Use	Minor amounts for vehicles and building heating
Noise	**SMALL**	Distance to Off-Site Receptor (miles)	See enrichment and deconversion
		Noise Levels	See enrichment and deconversion
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique or problematic waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL**	Occupational Risk	No injuries or fatalities during facility construction or operation.
		Construction Radiological Impacts (mrem/yr)	5 for workers No impacts to the public

Table A-6. HALEU Storage – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
		Operations Average Worker Dose (mrem/yr)	100
		Operations MEI Public Dose (mrem/yr)	~0
		Operations Population Dose (person-rem/yr)	~0
		Operations Chemical Risk	No chemical risk from normal operations
Public and Occupational Health – Accidents	**SMALL**	Radiological Accidents	A HALEU storage container breach is the only applicable accident; see enrichment and deconversion.
		Chemical Accidents	A HALEU storage container breach is the only applicable accident; see enrichment and deconversion.
Traffic	**SMALL**	Construction – Daily Vehicle Trips: Workers/Trucks	60/8
		Operations – Daily Vehicle Trips: Workers/Trucks	12/< 1
Socioeconomics	**SMALL**	Peak Construction Employment (direct)	30
		Operations Employment (direct)	6
		ROI Labor Force	See enrichment and deconversion.
Environmental Justice	**No disproportionate and adverse impacts on communities with environmental justice concerns are expected.**	Minority or low-income population in the ROI	Because of size of the facility (1 acre), small number of workers (6), and no routine release of radioactive or toxic materials, disproportionate adverse impacts are not expected.

Key: < = less than; BLM VRM = Bureau of Land Management Visual Resources Management; ft = feet; GLE = Global Laser Enrichment; gpd = gallons per day; HALEU = high-assay low-enriched uranium; HVAC = heating, ventilation, and air conditioning; IIFP = International Isotopes Fluorine Products; LLW = low-level waste; MEI = maximally exposed individual; MLLW = mixed low-level waste; mrem/yr = millirem per year; NAAQS = National Ambient Air Quality Standards; NEPA = National Environmental Policy Act; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter (fine particulates); ROI = region of influence; UUSA = Urenco USA

Notes:

[a] The impacts assessments in this table represent a single facility capable of handling 50% of the HALEU produced under the Proposed Action. Impacts denoted as potentially MODERATE would be associated with the specific site.

[b] Details regarding constructing and operating a uranium storage facility were developed from relevant NEPA documentation listed in Section A.5.2.2, *Existing NEPA Documentation* (Leidos, 2023).

[c] The impacts of greenhouse gases are evaluated in EIS Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.5.3.1 Ecological Resources

Any new construction occurring within undeveloped lands could have SMALL or MODERATE impacts on ecological resources depending on the resources disturbed, mitigation, and the minimization measures employed, despite the relatively small area (less than an acre) impacted by construction. Land-clearing activities as part of new construction could result in increased erosion, stormwater runoff, and loss of vegetation. Additionally, impacts on wildlife could include habitat fragmentation, disturbance, and injury or mortality, as habitats within the footprint disturbed by construction would be reduced or altered, and construction activities would result in habitat fragmentation. Loss of habitat could result in a long-term reduction in wildlife abundance and richness. Habitat disturbance could facilitate the spread and introduction of invasive plant species. Wildlife habitat could be adversely affected if invasive vegetation became established in the disturbed areas and adjacent off-site habitats. Construction activities could cause wildlife disturbance, including interference with behavioral activities. Wildlife could respond in various ways, including attraction, habituation, and avoidance. Principal sources of noise would include vehicle traffic and operation of machinery. Regular or periodic noise could cause adjacent areas to be less attractive to wildlife and result in a reduction in use. Construction activities could result in the direct injury or death of certain wildlife species. Wildlife could also be exposed to accidental fuel spills or releases of other hazardous materials. To avoid these impacts to wildlife, any new construction associated with a new HALEU storage facility should be placed in other previously developed areas of the site, if possible.

Pending site selection, an official USFWS IPaC data request would need to be submitted for the project under Section 7 of the Endangered Species Act to generate an *Official Species List* and identify if federally designated critical habitats are present. Additional analysis would be required to determine the severity and nature of impacts to the federally protected species as part of the final design and description of the project storage facility. Removal of native habitats would impact vegetation, wildlife, and possibly special status species. Special status species are defined as those protected under the Endangered Species Act, the Migratory Bird Treaty Act (16 U.S.C. 703–712), the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d), and state-listed species.

Migratory birds are protected under the Migratory Bird Treaty Act. Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d). Numerous migratory birds, including some birds of conservation concern and eagles, likely occur or have the potential to occur as transients throughout the vicinity of the proposed facility sites. The USFWS recommends conducting tree-clearing activities outside of the bird nesting season to avoid the need for active nest relocation or destruction, when appropriate. To avoid impacts to migratory birds, tree clearing within undeveloped lands would need to occur outside of the nesting season. Tree-clearing work during the nesting season would require a migratory bird nest survey 72 hours prior to the start of clearing activities.

Wetlands and/or water features (such as streams, lakes, ponds, or other waters) subject to protection under Section 404 of the CWA (33 U.S.C. 1251 et seq.) could occur within the Proposed Action area. Wetlands could be impacted by alteration of surface water runoff patterns, soil compaction, or groundwater flow. Pending facility site selection, formal wetland delineation surveys would be required to determine presence or absence of jurisdictional wetlands. Impacts to federally protected wetlands could require consultation with the U.S. Army Corps of Engineers to obtain a permit. Additionally, subsequent NEPA analysis under these actions may also be required.

Impacts on ecological resources are analyzed on a project-specific basis. The severity of impacts (i.e., SMALL or MODERATE) on ecological resources will be dependent on the current ecological conditions of the selected site, in comparison to the disturbance footprint associated with the facility designs. The requisite NEPA analysis for impacts to special status species and wetlands, in accordance with the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, CWA, and applicable state threatened and endangered species laws in its site selection process, and prior to construction of a new HALEU storage facility would need to be performed. The Endangered Species Act Section 7 consultation, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act analysis includes formal and/or informal consultations with the USFWS, while wetland impacts shall be coordinated with the U.S. Army Corps of Engineers. Local and state agencies shall be contacted for adverse impacts to state threatened and endangered species. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

Impacts on ecological resources could be expected to be lower (SMALL or none) if construction of a new facility were to occur in an already developed or disturbed site versus an undeveloped or undisturbed site.

A.5.3.2 Historic and Cultural Resources

Construction of a HALEU storage facility at an existing uranium fuel cycle facility or industrial site would likely occur on previously surveyed and disturbed areas and has the potential to impact approximately 1 acre of land. Therefore, impacts of construction at an existing uranium fuel cycle facility or industrial site would likely be SMALL. Construction of a HALEU storage facility at a previously undeveloped location has the potential to impact historic and cultural resources. The degree of impact, while limited due to the relatively small size of the facility and the implementation of BMPs would be dependent upon the historic and cultural characteristics of the selected site. Because of this, the impacts of construction at a previously undeveloped location are expected to result in SMALL to MODERATE impacts.

Operations and maintenance activities at a proposed HALEU storage facility have the potential to affect historic and cultural resources. Because there would be no additional land disturbance, no impacts on undiscovered cultural resources would be expected during operation. Therefore, the impacts from operations would likely be SMALL.

A.6 Transportation

A.6.1 Introduction

This section presents human health considerations associated with transport elements related to the implementation of the Proposed Action. Both radiological and nonradiological transportation impacts could result from shipment of radioactive material (natural uranium and HALEU products) and wastes. Radiological impacts are those associated with the effects from low levels of radiation emitted during incident-free transportation and from the accidental release of radioactive materials. Nonradiological impacts are independent of the nature of the cargo being transported and are expressed as traffic accident fatalities resulting only from the physical forces that accidents could impart to humans. The impacts of greenhouse gases emitted by transportation vehicles are evaluated in EIS Section 4.3.2, *Greenhouse Gases and Climate Change*.

Transportation packaging for radioactive materials is designed, constructed, and maintained to contain the package contents and provide radiation shielding. The type of packaging used is determined by the total radioactive hazard presented by the material within the packaging. For example, natural uranium ore is classified as a low-specific activity material with no activity limit and no specific packaging requirements, as covered under 49 CFR 173, *Shippers – General Requirements for Shipments and Packaging*. Requirements for motor carrier transportation can also be found in 49 CFR 350–399. The *Technical Report in Support of the HALEU EIS*, Section 6, *Human Health – Transportation*, Attachment A, provides additional details on the packaging used for the transport of various uranium forms (e.g., triuranium oxide or yellowcake [U_3O_8], UF_6, HALEU UF_6, HALEU UO_2, or HALEU metal) in this HALEU EIS (Leidos, 2023).

A.6.2 Analysis Methodology

A.6.2.1 Approach to NEPA Analysis

The NRC performed generic analyses of the environmental effects of transportation during uranium fuel cycle activities in the *Environmental Survey of the Uranium Fuel Cycle* (WASH-1248) (AEC, 1974) and transportation of fuel and waste to and from light water reactors (LWRs) in the *Environmental Survey of Transportation of Radioactive Materials To and From Nuclear Power Plants* (WASH-1238) (AEC, 1972) and in a supplement to WASH-1238, NUREG-75/038 (NRC, 1975), and found the impacts to be SMALL. These documents provided the basis for Table S-3 (AEC, 1974) and Table S-4 (AEC, 1972; NRC, 1975) in 10 CFR 51.51 and 50.52, respectively. Impacts are provided for normal conditions of transport and accidents in transport for a reference 1,100 megawatt electrical LWR.[8] Table S-3 in 10 CFR 51.51 summarizes the environmental impacts of transportation for the uranium fuel cycle to be 2.5 person-rem exposure to the workers and public per year. Table S-4 in 10 CFR 50.52 summarizes the estimated dose to transportation workers during normal transportation operations to be 4 person-rem and collective dose to the public along the route and the dose to onlookers were estimated to result in 3 person-rem per reactor per year of operation.

Since the publication of WASH-1238 (AEC, 1972), WASH-1248 (AEC, 1974), and NUREG-75/038 (NRC, 1975), the NRC has undertaken additional studies regarding the risk from the transportation of fuel cycle, unirradiated fuel and spent nuclear fuel (SNF). In 1977, the NRC published NUREG-0170, *Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes*, which assessed the adequacy of the regulations in 10 CFR 71, then titled *Packaging and Transportation of Radioactive Waste* – NUREG-0170 (NRC, 1977). In that assessment, the measure of safety was the risk associated with radiation doses to the public under routine and accident transport conditions, and the risk was found to be acceptable. The approach and methodology in this study formed the basis of all future studies in determining the transportation risk involving radioactive materials. Later, the NUREG-0170 model for transport of SNF was further refined. In 1987, in a study known as the "Modal Study," (NUREG/CR-4829) (NRC, 1987), the accident consequences were described in terms of the resultant strains produced in transportation packages (for impacts) and the increase in package temperature (for fires). In 2000, in the re-examination study (NUREG/CR-6672) (NRC, 2000), two generic truck packages and two generic rail packages were analyzed using the refined model on package structures and response to accidents. The study conservatively used semi-trailer truck and rail accident

[8] Note that the basis for Tables S-3 and S-4 is a 1,100 megawatt electrical LWR, with the assumption of 80% capacity factor for the operation (Table S-4).

statistics for general freight shipments, because even though more than 1,000 spent fuel shipments had been completed in the United States by the year 2000 and many thousands more had been completed safely internationally, there had been too few accidents involving spent fuel shipments to provide statistically valid accident rates. These two studies estimated smaller assessed risks than had been projected in NUREG-0170.

The analysis for potential transportation-related human health impacts associated with the Proposed Action and post-Proposed Action activities was informed by the studies described above as well as information presented in existing NEPA documentation of potential generic environmental consequences associated with various uranium fuel cycle activities, such as uranium mining and milling (NRC, 2009a), advanced nuclear reactors (ANRs) (NRC, 2021c), and SNF management (NRC, 2014c). Details provided in location-specific NEPA documentation relating to an existing conversion facility (NRC, 2019), enrichment facilities (NRC, 2005a; NRC, 2006; DOE, 2011; NRC, 2012b; NRC, 2015), deconversion facilities (NRC, 2012a), and fuel fabrication facilities (NRC, 2009b; NRC, 2012b) were also considered in the analysis and incorporated by reference (see Table A-7). It was assumed, for purposes of analyzing the Proposed Action, that an enrichment building (NRC Category II facility) is constructed next to an existing LEU enrichment building (NRC Category III). Also, for the purposes of this EIS, and to maximize the impacts in the absence of any specific location within an existing private commercial facility, it was considered that transportation between facilities (such as between an enrichment facility and a deconversion facility) would be most conservatively estimated when using the same route characteristics as the route between the farthest-separated existing facilities (i.e., GLE in Wilmington, North Carolina, and the Framatome [formerly AREVA NP] fuel fabrication facility in Richland, Washington).

A.6.2.2 Existing NEPA Documentation

For **uranium mining and milling**, the NRC's GEIS on uranium milling projects addressed conventional mining, and the GEIS for ISR facilities and its Supplements addressed ISR activities. The ISR GEIS and its Supplements provided details on the annual number of truck shipments of yellowcake to a conversion facility that were previously analyzed under NEPA:

- *Final Generic Environmental Impact Statement on Uranium Milling Project.* NUREG-0706. U.S. Nuclear Regulatory Commission (NRC, 1980)
- *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities.* NUREG-1910. U.S. Nuclear Regulatory Commission Office of Federal and State Materials and Environmental Management Programs and the Wyoming Department of Environmental Quality Land Quality Division (NRC, 2009a)
- *Environmental Impact Statement for the Moore Ranch ISR Project In Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 1* (NRC, 2010)
- *Environmental Impact Statement for the Nichols Ranch ISR Project in Campbell and Johnson Counties, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 2* (NRC, 2011a)
- *Environmental Impact Statement for the Lost Creek ISR Project in Sweetwater County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 3* (NRC, 2011b)

- *Environmental Impact Statement for the Dewey-Burdock Project in Custer and Fall River Counties, South Dakota: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 4* (NRC, 2014a)
- *Environmental Impact Statement for the Ross ISR Project in Crook County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 5* (NRC, 2014b)
- *Environmental Impact Statement for the Reno Creek In Situ Recovery Project in Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, Final Report NUREG-1910 Supplement 6* (NRC, 2016)

For the **uranium conversion activity**, the NRC's Metropolis EA provided details on annual shipments (e.g., 700 yellowcake and 600 UF_6) that were previously analyzed under NEPA:

- *Environmental Assessment for the Proposed Renewal of Source Material License SUB–526 Metropolis Works Uranium Conversion Facility (Massac County, Illinois)* (NRC, 2019)

For **enrichment activities**, to extrapolate the potential environmental consequences of transportation related to enrichment, the analysis drew on the details provided in five NEPA documents that evaluated transportation impacts of annual shipments of UF_6 feed to the enrichment facilities and shipments of enriched UF_6 to fuel fabrication facilities:

- *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio (DOE adopts NUREG-1834)* (DOE, 2011)
- *Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*, *NUREG-1790* (NRC, 2005a)
- *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio, NUREG-1834* (NRC, 2006)
- *Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina, NUREG-1938* (NRC, 2012b)
- *Environmental Assessment for the Proposed Louisiana Energy Services, URENCO USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico* (NRC, 2015)

For **deconversion activities**, impacts would be related to transporting HALEU UF_6 to the deconversion facility if the deconversion is not done at an enrichment facility. To estimate a conservative distance for the transportation of such HALEU UF_6, the distance between a possible deconversion facility (the IIFP facility in New Mexico) and most-distant existing enrichment facility (the GLE facility in North Carolina) was determined. Details in the NRC's EIS for the IIFP deconversion plant in New Mexico regarding shipments of DUF_6 to that plant were used to extrapolate potential environmental consequences associated with transportation of HALEU UF_6 to a deconversion facility as a result of the Proposed Action:

- *Environmental Impact Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico – Final Report, NUREG-2113* (NRC, 2012a)

Impacts may also occur when transporting HALEU UF_6 from an enrichment facility to a fuel fabrication facility for deconversion (instead of at IIFP). Analysis for that option is evaluated in the enrichment facilities analyses, as the HALEU UF_6 was assumed to be transported to the farthest fuel fabrication facility from each enrichment facility to envelop the risk. (See the list of existing NEPA documentation for enrichment activities.)

For **HALEU storage activities**, it was determined that HALEU storage could occur at enrichment facilities, deconversion facilities, or a standalone facility. For the purposes of this EIS, and to maximize the impacts in the absence of any specific location within an existing private commercial facility, it was assumed that the storage facility would be located at a location with the same route characteristics as that of the route between GLE in Wilmington, North Carolina, and the Framatome fuel fabrication in Richland, Washington, and the GLE EIS provided details regarding storage capacities and route characteristics for transportation of HALEU intended for storage:

- *Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina*, *NUREG-1938* (NRC, 2012b)

For fuel fabrication activities, the impact of transporting HALEU O_2 or metal to a fuel fabrication facility is bounded by the impact analysis evaluated for a fuel storage facility, which was assumed to be located at the Framatome facility in Richland, Washington, to conservatively estimate a distance for transporting enriched uranium to a fuel fabrication facility.

The Draft NRC Advanced Reactor Generic EIS (NUREG-2249) evaluated the various aspects of HALEU use in advanced reactors:

- *Draft Generic Environmental Impact Statement for Advanced Nuclear Reactors (ANRs), NUREG-2249* (NRC, 2021c)

Environmental effects of continued storage of SNF were evaluated in the *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel*, which included an evaluation of the potential impacts of transporting SNF to a final repository:

- *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel*, *NUREG-2157* (NRC, 2014c)

A.6.3 Potential Environmental Consequences

The NRC issued two Generic EISs (GEISs) for uranium recovery using the conventional mining and milling (NRC, 1980) and ISR mining (NRC, 2009a). These GEISs concluded that the impacts of transporting various radioactive materials to and from the uranium mining and milling sites to be SMALL. The NRC has also issued EAs or EISs for the conversion facility, enrichment facilities, and fuel fabrication facilities, all showing the transportation impacts for radioactive materials transports to be SMALL, as well.

The Proposed Action activities, including uranium recovery, conversion, and shipments of UF_6 to and from enrichment facilities are similar to those of the activities evaluated in the LWRs fuel cycle. The transport of the HALEU in the form of UF_6 to the fuel fabrication facilities is also similar to those used in the LWRs fuel cycle, but with a criticality modified packaging with lower quantities of enriched uranium per shipment. The HALEU fuel may be used in ANRs, as well as research reactors. Several of the potential non-LWR designs are expected to deploy non-UO_2 fuels (e.g., uranium metal, uranium carbide, uranium in a molten salt, etc.) or rely on up-recycled fissile material. In the *Generic Environmental Impact Statement for Advanced Nuclear Reactors - Draft Report for Comment* (hereinafter referred to as the "ANR GEIS") (NUREG-2249) (NRC, 2021c), the NRC evaluated the various potential fuel fabrication needs for the ANRs. In Section 3.14 of that ANR GEIS, the NRC concluded that the assessment of environmental impacts,

Table S-3 of 10 CFR 51.51, is expected to bound the impacts for ANRs that rely on uranium oxycarbide/UO_2 fuels if such fuel fabrication is applying the existing processes of the NRC-licensed fuel fabrication facilities, resulting in SMALL impacts (NRC, 2021c, pp. 3-169).

If ANR fuel fabrication, namely metallic fuel and liquid-fuel for molten salt reactors, is not bounded by WASH-1248, project-specific analysis would be required.

The treatment and management of the SNF at both LWRs and ANRs using HALEU are the same. Consistent with the findings in the NRC 2014 final rule on the environmental effects of continued storage of SNF (10 CFR 51) and NUREG-2157, the *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC, 2014c), the ANR GEIS concluded that impacts from continued storage of SNF for 60 years, including the potential impacts of transporting the SNF to a final repository would be SMALL. For the transportation of SNF, the NRC staff concluded that the radiological doses would be expected to continue to remain below the regulatory dose limits during continued storage and all of the related activities would have small environmental impacts (NRC, 2014c, p. § 4.16).

Notwithstanding the above conclusions, an evaluation of transportation impacts for uranium fuel cycle activities were evaluated (Leidos, 2023). The human health transportation risk analysis in this HALEU EIS incorporates by reference resource conditions and impact considerations of the primary existing NEPA documentation sources listed in Section A.6.2.2, *Existing NEPA Documentation*, as well as other related online/available sources including site-specific NEPA documentation and Federal and state databases (Leidos, 2023). The analysis provides a range of potential impacts that could occur for transporting various radioactive materials (e.g., feed, product, and wastes) from each activity/process for HALEU production. Table A-7 summarizes the results of the transportation impacts for the various Proposed Action activities (associated with the transportation needs for one uranium enrichment contract at an assumed production rate of 25 MT per year), along with the sources of NEPA documentation and major assumptions. As shown in this table, and consistent with the expectation as concluded in 10 CFR 51, the impacts of transporting radioactive materials related to the Proposed Action in the HALEU EIS would be SMALL.

Table A-7. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	***Input: Material/Shipments Needed to Produce 25 MT/yr HALEU***	***Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU***	***NEPA Documentation Sources/Assumptions/Notes***	***Transportation Impacts and Conclusions***
Uranium Mining and Recovery – *Conventional Mining and Milling* *In-Situ Recovery (ISR) of Uranium*	*Mining*: 1,320,000 MT of ore (assuming ore quality of 0.001 [and 91% extraction]) Shipments About 185 truck shipments per day, each containing 23 MT of ore, for 310 days per year transport to the milling processing facility. *ISR*: 0 [all extraction occurs underground]	Output: 1,260 MT of U_3O_8 (yellowcake) [95% purity], leading to ~1,200 MT of yellowcake Containers: 55-gallon drums Shipments: 74 truck loads Based on using 55-gallon drums containing U_3O_8, and 40 drums per truck, or 17.2 MT yellowcake, per truck	NEPA documentation: NUREG-0706 (NRC, 1980) for conventional mining NUREG-1910 (NRC, 2009a) and its Supplements for ISR facilities Also, DOE/EIS-0472 (DOE, 2014) [Uranium Leasing Program PEIS documents] for additional insights on mining	SMALL The annual 74 truck load shipments of yellowcake to the conversion facility are within the range of transports analyzed in NUREG-1910, and consistent with the conclusion in this NEPA document; the overall transportation impacts would be SMALL.
Uranium Conversion – Uranium ore conversion to UF_6 at the ConverDyn facility[9] in Metropolis, IL, or a new conversion facility	Input: 1,260 MT of U_3O_8 With 74 truckloads per year	Output: 1,530 MT of UF_6 (assuming 98% pure UF_6) Container: 48-Y (12.5 MT maximum, or an average of 12 MT) cylinders containing UF_6. Shipments: 123–128 shipments per year	NEPA documentation: NRC's Metropolis EA (NRC, 2019): The existing Metropolis facility (ConverDyn) is also used to supply feed for LEU fuel production and has sufficient conversion capacity to support both LEU and HALEU fuel production.	SMALL Given that the annual shipments of HALEU-related activities (e.g., 74 shipments of yellowcake and up to 128 shipments of UF_6) is a small fraction of the existing transports (e.g., 700 yellowcake and 600 UF_6), in the Metropolis EA, and consistent with the EA's conclusions, the overall transportation impacts would be SMALL. If a new conversion facility is used, the conclusion will remain

9 The ConverDyn facility is used as a surrogate for the purposes of analysis in this EIS.

Table A-7. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	*Input: Material/Shipments Needed to Produce 25 MT/yr HALEU*	*Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU*	*NEPA Documentation Sources/Assumptions/Notes*	*Transportation Impacts and Conclusions*
				unchanged, as the number of uranium-related shipments are relatively small—about 6 to 11 shipments per month.
HALEU Enrichment – HALEU enrichment using[10]: Centrifuges at Centrus in OH, Centrifuges at Urenco in NM, or Lasers at GLE in Wilmington, NC[11]	Input: 1,530 MT of UF_6 in 123–128 shipments of 48-Y cylinders per year	Output: 38 MT HALEU UF_6 Container: 30B-20 cylinder in DN30-20 protective structure packaging (PSP) overpack with an average UF_6 mass of 1.25 MT per cylinder), leading to a minimum of 31 DN30-20 PSPs. Shipments: Eight shipments per year (assuming four PSPs per truck).	NEPA Documentation: Urenco, (or UUSA), NM, NUREG-1790 (NRC, 2005a) and NRC UUSA EA (NRC, 2015) Centrus, (ACP) OH, NUREG-1834 (NRC, 2006) and DOE/EIS-0468 (DOE, 2011) [which adopted NUREG-1834] GLE, NC, NUREG-1938 (NRC, 2012b) It was assumed, for purposes of analyzing the Proposed Action, that an enrichment building (NRC Category II facility)[12] is constructed next to an existing LEU enrichment building (NRC Category III).	SMALL The three enrichment facilities evaluated transportation impacts of annual shipments between 900 (GLE) to 1,259 (UUSA) of UF_6 feed, and between 50 (GLE) to 300 (ACP) shipments of enriched uranium to a fuel manufacturing facility. Considering that this EIS has an estimate of 128 shipments of feed and 8 shipments of products, and consistent with the NRC's conclusions in the cited NEPA documents, the overall transportation impacts would be SMALL.
HALEU Enrichment – HALEU enrichment at two locations:* First enrich up to 5%	Input: 1,767 MT of UF_6	Output: 38 MT HALEU UF_6 Container:	NEPA Documentation: Urenco, (or UUSA), NM, NUREG-1790 (NRC, 2005a) and NRC UUSA EA (NRC, 2015)	SMALL The three enrichment facilities evaluated transportation impacts of

10 These facilities would be analyzed as representative of two types of technologies and facilities that could produce HALEU in the timeframe required.

11 Even though the license for this facility was terminated on January 5, 2021 (NRC website| https://www.nrc.gov/materials/fuel-cycle-fac/new-fac-licensing.html, accessed on May 4, 2023), the facility was selected to represent a new enrichment process and provide a reasonable alternative to gaseous centrifuge.

12 HALEU facilities would be NRC Category II facilities. LEU facilities are NRC Category III facilities. NRC Category II facilities require additional security measures.

Table A-7. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle (a)

Activity	*Input: Material/Shipments Needed to Produce 25 MT/yr HALEU*	*Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU*	*NEPA Documentation Sources/Assumptions/Notes*	*Transportation Impacts and Conclusions*
Second, enrich to 19.75% * With the use of two enrichment locations there are some inefficiencies in enrichments activities that would lead to the need for larger quantities of natural UF_6 than for a single location, and thus 142–148 shipments of UF_6 for two enrichment locations are addressed as opposed to 124–128 shipments of UF_6 with a single enrichment location.	In 142–148 Shipments of 48-Y cylinders per year in the first year; 1,627 MT of UF_6 in 132–136 cylinders then after. Note, about 140 MT of (about 1% enriched U-235) UF_6 would be transported (recycled) from second enrichment location to the first enrichment location, as feed materials.	30B-20 cylinder in DN30-20 PSP) overpack with an average UF_6 mass of 1.25 MT per cylinder), leading to a minimum of 31 DN30-20 PSPs. Shipments: Eight shipments per year (assuming four PSPs per truck). The LEU (5% enriched) product shipments between the enrichment locations: 178 MT of UF_6: 15 shipments In 30B cylinders, with an average UF_6 mass of 2.5 MT, as currently being used in the LWRs fuel cycle.	Centrus, (ACP) OH, NUREG-1834 (NRC, 2006) and DOE/EIS-0468 (DOE, 2011) [which adopted NUREG-1834] GLE, NC NUREG-1938 (NRC, 2012a) It was assumed that an enrichment building (NRC Category II facilities)[13] is constructed at Centrus Plant, next to an existing LEU enrichment building (NRC Category III).	annual shipments between 900 (GLE) to 1,259 (UUSA) of UF_6 feed, and between 50 (GLE) to 300 (ACP) shipments of enriched uranium to a fuel manufacturing facility. Considering that this EIS has an estimate of maximum 148 shipments of feed in the first year and 136 shipments then after, 15 shipments of LEU, and 8 shipments of HALEU products, and consistent with the NRC's conclusions in the cited NEPA documents, the overall transportation impacts would be SMALL.
HALEU Deconversion – HALEU deconversion at enrichment facilities at: Centrus in OH, Urenco in NM, GLE in Wilmington, NC or at a commercial facility	Input: 38 MT HALEU UF_6 in 31 30B-20 PSPs and 8 shipments	Output: 25 MT HALEU metal or 28 MT HALEU O_2 (oxide) Container: *HALEU Metal* in ES-3100 with up to 35 kg of uranium per container	Deconversion produces O_2 and metal. Note: If the deconversion is occurring at the enrichment facility, the HALEU UF_6 is already at that facility.	SMALL For the new deconversion facility at the International Isotopes Fluorine Plant facility, the transport of HALEU UF_6 was assumed to be from the GLE enrichment facility, in Wilmington, NC, which leads to

[13] HALEU facilities would be NRC Category II facilities. LEU facilities are NRC Category III facilities. NRC Category II facilities require additional security measures.

Table A-7. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	*Input: Material/Shipments Needed to Produce 25 MT/yr HALEU*	*Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU*	*NEPA Documentation Sources/Assumptions/Notes*	*Transportation Impacts and Conclusions*
		This will lead to 715 ES-3100 packages. *HALEU O_2* in a generic cylinder that could contain 28.12 kg of UO_2 (INL, 2019), leading to 1,009 cylinders. Shipments: *HALEU Metal* 36 shipments of ES-3100 (Assuming 20 ES-3100 per shipment) *HALEU O_2* 8 shipments (Assuming that OPTIMUS®-L is certified, then each can contain 28 cylinders of UO_2, with 5 OPTIMUS®-L per semi-truck, or 3,937 kg of UO_2 per truck)	If new facilities to be constructed, assumed to be at the International Isotopes Fluorine Plant (NM) facility, as evaluated in NUREG-2113 (NRC, 2012a). The impact under this assumption is focused on transporting HALEU UF_6 to the deconversion facility.	farthest distance among the three facilities considered, above. Considering that this EIS has an estimate of eight shipments of HALEU UF_6, and consistent with the NRC's conclusions in the cited NEPA document (NUREG-2113) (NRC, 2012a) and adjustment for the expected external dose rate for the HALEU product, the overall transportation impacts would be SMALL.
HALEU Deconversion - HALEU deconversion at existing FFFs at: Framatome (Richland, WA), GNF (Wilmington, NC), Westinghouse (Columbia, SC)	Same as above	Same as above	Assumes deconversion produces O_2 and metal The impact analysis for this option is evaluated in the enrichment facilities analyses, as the HALEU UF_6 was assumed to be transported to the farthest FFF from each	SMALL Considering that this EIS has an estimate of eight shipments of products, and these are assumed to be transported from the enrichment facilities to the FFF that is at the farthest distance, and consistent with the NRC's

Table A-7. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	*Input: Material/Shipments Needed to Produce 25 MT/yr HALEU*	*Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU*	*NEPA Documentation Sources/Assumptions/Notes*	*Transportation Impacts and Conclusions*
			enrichment facility to envelop the risk.	conclusions in the cited enrichment facilities NEPA documents, the overall transportation impacts would be SMALL.
HALEU Storage – HALEU storage at existing enrichment facilities, deconversion facility, FFF, or a standalone facility	38 MT HALEU UF_6; 31 30B-20, (Not considered) 25 MT HALEU metal; or in 715 ES-3100 28 MT HALEU O_2 in 1,009 generic cylinders	38 MT of UF6, in 31 30B-20 (Not considered) 25 MT of HALEU metal in 715 ES-3100 36 shipments 28 MT of HALEU O_2 in 1,009 generic cylinders; 8 shipments	For the purposes of this EIS, and to maximize the impacts in the absence of any specific location within an existing private commercial facility, it was assumed that the storage facility would be located at a location with the same route characteristics as that of the route between GLE in Wilmington, NC, and Framatome fuel fabrication in Richland, WA (NRC, 2009b).	SMALL The impact analysis is based on the results presented in NUREG-1938 (NRC, 2012b) and adjusted for the differences in the expected external dose rates for the enriched UF_6 and HALEU O_2 in their respective transportation packages. Consistent with the NRC's conclusions in the cited enrichment facility NEPA document, the overall transportation impacts would be SMALL.
HALEU Fuel Fabrication – HALEU fuel fabrication at: BWXT (Lynchburg, VA), TRISO-X (Oak Ridge, TN), USNC (Oak Ridge, TN), Framatome (Richland, WA), GNF (Wilmington, NC), Westinghouse (Columbia, SC)[14]	25 MT HALEU metal; or 28 MT HALEU O_2	Not specifically analyzed	It was assumed that new HALEU fuel fabrication buildings are constructed next to the LEU fuel fabrication buildings at existing LEU FFFs. Assumes metal, oxide, and TRISO fuels are fabricated.	SMALL The impact of transporting HALEU O_2 or metal to an FFF is bounded by the impact analysis evaluated for the fuel storage facility, which was assumed to be located at the Framatome facility in Richland, WA; see above.

14 These six facilities/sites provide a range of facility sizes and locations that should be representative of other facilities at other locations.

Table A-7. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	***Input: Material/Shipments Needed to Produce 25 MT/yr HALEU***	***Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU***	***NEPA Documentation Sources/Assumptions/Notes***	***Transportation Impacts and Conclusions***
HALEU use in Advanced Reactors HALEU Spent Nuclear Fuel (SNF) Off-Site Storage HALEU SNF Disposal	Not specifically analyzed	Not specifically analyzed	Draft NRC Advanced Reactor Generic EIS (NUREG-2249) (NRC, 2021c) evaluated the various aspects of HALEU use in advanced reactors, with the potential transportation impacts to be SMALL. The environmental effects of continued storage of SNF in NUREG-2157, *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC, 2014c), concluded that impacts from continued storage of SNF for 60 years, including the potential impacts of transporting the SNF to a final repository would be SMALL.	SMALL Note: The HALEU SNF, for the most part, (except for the molten salt fuel) are similar to the LWR and other DOE SNFs that are currently being stored at various facilities. Therefore, the general conclusion for the storage and disposition of SNF would be applicable to the HALEU SNF. Given the conclusions in NUREG-2249 and NUREG-2157, the transportation impacts for these HALEU-related activities are expected to be SMALL as well.

Key: % = percent; ACP= American Centrifuge Plant (Centrus); DOE = U.S. Department of Energy; EA = Environmental Assessment; EIS = Environmental Impact Statement; FFF = fuel fabrication facility; GLE = Global Laser Enrichment; HALEU = high-assay low-enriched uranium; HALEU UF_6 = high-assay low-enriched uranium in the form of uranium hexafluoride; HALEU O_2 = high-assay low-enriched uranium dioxide; IL = Illinois; ISR = in-situ recovery; kg = kilograms; LEU = low-enriched uranium; LWR= light water reactor; MT = metric tons; MT/yr = metric tons per year; NC = North Carolina; NEPA = National Environmental Policy Act; NM = New Mexico; NRC = U.S. Nuclear Regulatory Commission; O_2 = oxide; OH = Ohio; PEIS = Programmatic Environmental Impact Statement; PSP = protective structure packaging; SC = South Carolina; SNF = spent nuclear fuel; TN = Tennessee; U-235 = uranium-235; U_3O_8 = triuranium octoxide (i.e., yellowcake, a uranium oxide); UF_6=uranium hexafluoride; UO_2 = uranium oxide; USNC = Ultra Safe Nuclear Corporation; UUSA = Urenco USA; VA= Virginia; WA = Washington

Note:

[a] DOE may exercise multiple contracts for HALEU production in support of the Proposed Action. This EIS assumed an annual production rate of 25 MT per year per contract (DOE, 2023b) or 50 MT per year combined for all contracts. The analyses herein are based on an assumed annual production level of 25 MT of HALEU.

A.7 Related Post-Proposed Action Activities

In addition to the above actions that are a direct part of the Proposed Action, discussions of other actions that would be expected from use of the 290 MT of HALEU are acknowledged as reasonably foreseeable activities, but are discussed in less detail given their more uncertain nature. These actions include:

- Construction and operation of a facility or facilities for fabrication of metal, oxide, and tri-structural isotropic (TRISO) reactor fuel
- Construction and operation of commercial advanced reactors that use HALEU fuel and the use of HALEU fuel in existing demonstration, test, and isotope production reactors
- HALEU SNF storage and disposition

These actions are dependent upon decisions outside of the Proposed Action activities. The extent to which the actions happen and where they happen is still developing and is only partly known. Therefore, detailed assessment of their total impacts is not currently possible. Each of the activities listed above would be subject to NEPA analysis by the NRC.

A.7.1 HALEU Fuel Fabrication

A.7.1.1 Introduction

Fuel fabrication is the last step in the process of turning uranium into nuclear fuel for reactors. The fuel fabrication facility would receive HALEU from the deconversion facility. The deconversion facility could provide HALEU in forms such as uranium oxides (e.g., uranium dioxide, UO_2), uranium metal, uranium fluorides, uranium silicides, and uranium nitrides. A HALEU fuel fabrication facility or facilities[15] would convert HALEU into fuel for nuclear reactors. The design and composition of nuclear fuels are predominantly dictated by the engineering requirements necessary for their function in reactors of various designs. Depending on the reactor design, the fuel fabrication facility could produce nuclear fuels of varying forms such as uranium oxide fuel, metal fuel, molten salt fuel, TRISO particle fuel, uranium nitride fuel, and advanced ceramic fuel.

A fuel fabrication facility could be sited anywhere in the United States as long as the facility meets NRC siting requirements. The production of HALEU may be accomplished through modification of an existing fuel fabrication facility or through development of a new fuel fabrication facility. Development of a new fuel fabrication facility may be preferred by some organizations because of a specific fuel package requirement for their ANR.

The fabrication of HALEU fuel is required to occur in an NRC Category II facility. However, fabrication of HALEU fuel could also be performed in a Category I (greater security than Category II) facility. The BWXT facility (NRC, 2005b) in Lynchburg, Virginia, is a Category I facility, and the site's fuel fabrication facility is the only U.S. facility currently capable of fabricating HALEU fuel using production-scale equipment. The Framatome (formerly AREVA NP) fuel fabrication facility (NRC, 2009b) in Richland, Washington, the Global Nuclear Fuel – Americas (GNF-A) fuel fabrication facility (NRC, 2009c) in Wilmington, North Carolina, and the Westinghouse Electric Company, LLC. fuel fabrication facility (NRC, 2021d) in Columbia, South

15 One or more HALEU fuel fabrication facilities could be constructed. For simplicity, this fact is not repeated in the remainder of the section.

Carolina, are Category III facilities currently licensed by the NRC to fabricate LEU nuclear fuel for LWRs. These Category III facilities could be modified to produce HALEU fuel.

Multiple domestic vendors such as X-energy, LLC (X-energy) (X-energy, 2022), GNF-A (GNF-A, 2021), and Ultra Safe Nuclear Corporation (WNN, 2022) either have small quantity HALEU fuel manufacturing capabilities or have expressed an interest in fabricating HALEU fuel. TRISO-X plans to produce TRISO fuel at a fuel fabrication facility in Oak Ridge, Tennessee. X-energy has prepared an Environmental Report for this facility (TRISO-X, 2022), and the NRC is in the process of preparing NEPA documentation.

A.7.1.2 Analysis Methodology

A.7.1.2.1 Approach to NEPA Analyses

This HALEU EIS is based on resource conditions and impact analyses in the existing NEPA documents discussed in Section A.7.1.2.2, *Existing NEPA Documentation*, as well as other available information such as new census data. The intent of the HALEU EIS is to provide a range of potential impacts from construction and operation of a HALEU fuel fabrication facility based on the existing NEPA documentation and other available sources.

A new HALEU fuel fabrication facility could be constructed and operated at any one of the seven fuel fabrication facilities: Framatome, Inc. (Richland, Washington); GNF-A (Wilmington, North Carolina); Westinghouse Electric/Columbia Fuel Fabrication Facility (FFF) (Columbia, South Carolina); Nuclear Fuel Services (Erwin, Tennessee); BWXT (Lynchburg, Virginia); and TRISO-X (Oak Ridge, Tennessee). Although the HALEU fuel fabrication facility could be located at one of the seven described sites, locating the HALEU fuel fabrication facility at another site would likely have similar impacts.

To bound the potential impacts, DOE has assumed that the HALEU fuel fabrication facility would have a full complement of support facilities and structures. If the HALEU fuel fabrication facility were constructed at an existing site with existing site infrastructure, many of the support facilities and much of the infrastructure would likely be used to support the new HALEU fuel fabrication facility along with existing activities. For example, office buildings and warehouses may be able to support both activities, and fences and guards would likely provide protection for all the facilities at the site. Therefore, analyzing construction and operation of a new HALEU fuel fabrication facility would likely overestimate (or bound) the impacts of locating this facility at an existing site.

The fuel fabrication facilities listed above have throughputs ranging from 400 to 1,600 MT of uranium per year. To fabricate fuel from the HALEU produced from the Proposed Action, it has been assumed that the HALEU fuel fabrication facilities would need a total production rate of 50 MT/yr. This could be accomplished by constructing and operating multiple smaller fuel fabrication facilities (< 25 MT/yr) at multiple sites. Therefore, many of the attributes of the LEU fuel fabrication facilities would be much larger than needed for HALEU fuel fabrication and would likely bound the impacts of the HALEU fuel fabrication facility.

DOE has analyzed construction and operation of a HALEU fuel fabrication facility based on available data for the fuel fabrication facilities listed above. Most attributes of facilities that fabricate HALEU fuels are expected to be bounded by this analysis. In any event, project-specific NEPA documentation would be completed by the NRC before construction and operation of a HALEU fuel fabrication facility.

A.7.1.2.2 Existing NEPA Documentation

The affected environment and environmental consequences at a facility that fabricates HALEU fuel are expected to be comparable to those at a facility that fabricates LEU fuel. To understand the impacts of developing a HALEU fuel fabrication facility, DOE reviewed the NRC's NEPA documentation for the

Framatome, GNF-A, Westinghouse, and BWXT fuel fabrication facilities. Licensing is in progress for the TRISO-X facility and in the absence of a NEPA document for the facility, DOE reviewed the environmental report submitted to the NRC in support of the license application for evaluation of the TRISO-X Fuel Fabrication Facility. These documents, which provide DOE with information and analyses for determining the impacts of construction and operation of a HALEU fuel fabrication facility, include:

- ***Framatome, Inc. –*** *Environmental Assessment for the Renewal of U.S. Nuclear Regulatory Commission License No. SNM–1227 for AREVA NP, Inc. Richland Fuel Fabrication Facility* (NRC, 2009b)
- **Global Nuclear Fuel – Americas (GNF-A) –** *Environmental Assessment for the Renewal of U.S. Nuclear Regulatory Commission License No. SNM–1097 for Global Nuclear Fuel – Americas, Wilmington Fuel Fabrication Facility* (referred to as the "GNF-A EA") (NRC, 2009c)
- **Westinghouse Electric Company, LLC –** *Final Environmental Impact Statement for the License Renewal of the Columbia Fuel Fabrication Facility in Richland County, South Carolina,* NUREG-2248 (referred to as the "CFFF EIS") (NRC, 2022a)
- **BWX Technologies, Inc. (BWXT) –** *Environmental Assessment Related to the Renewal of NRC License No. SNM-42 for BWX Technologies, Inc. (BWXT)* (referred to as the "BWXT EA") (NRC, 2005b)
- ***X-energy, LLC (X-energy) / TRISO-X –*** *Environmental Report for the TRISO-X Fuel Fabrication Facility* (referred to as the "TRISO-X FFF ER") (TRISO-X, 2022)

  Information related to licensing of the TRISO-X facility is available at https://www.nrc.gov/info-finder/fc/triso-x.html#environmental.

A.7.1.3 Potential Environmental Consequences

The affected environment and environmental consequences at a facility that fabricates HALEU fuel are expected to be similar to those at a facility which fabricates LEU fuel. Therefore, DOE has summarized the environmental consequences information from NEPA documents for the Framatome FFF (NRC, 2009b), the GNF-A FFF (NRC, 2009c), and the Westinghouse Electric Company FFF (NRC, 2021d). In addition, DOE has summarized impacts described in the EA prepared for the BWXT facility and the environmental consequences described in the Environmental Report prepared for the TRISO-X FFF (TRISO-X, 2022).

The LEU fuel fabrication facilities considered in this analysis have throughputs ranging from 400 to 1,600 MT uranium per year. To achieve the Proposed Action of 290 MT of HALEU, approximately 50 MT/yr of HALEU fuel would need to be produced. Therefore, many of the attributes of the LEU fuel fabrication facilities would be much larger than needed for a HALEU fuel fabrication facility and would likely bound the impacts of a HALEU fuel fabrication facility.

DOE has analyzed construction and operation of a HALEU fuel fabrication facility based on available NEPA analyses and other data for the fuel fabrication facilities (Leidos, 2023). Most attributes of a HALEU fuel fabrication facility are expected to be bounded by this analysis. In any event, project-specific NEPA documentation would be completed by the NRC before construction and operation of a HALEU fuel fabrication facility.

The Proposed Action's impact assessments for fuel fabrication facilities are presented in Table A-8 below. Details regarding a fuel fabrication facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.7.1.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-8 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences among facilities are presented.

Table A-8. Fuel Fabrication – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment*** [(a)]	***Impact Indicator***	***Key Information*** [(b)]
Land Use	**SMALL**	Land Disturbed (acres)	53 – Framatome 302 – GNF-A 68 – CFFF 39 – BWXT 110 – TRISO-X
		Total Site Size (acres)	320 – Framatome 1,164 – GNF-A 1,151 – CFFF 497 – BWXT 110 – TRISO-X
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL to MODERATE**	Tallest Substantial Structure (other than met/T-line towers) (feet)	100 – stack for TRISO-X
		Distance to Nearest Receptor (miles)	1.5 – Framatome 0.4 – GNF-A 0.6 – CFFF 0.5 – BWXT 0.7 – TRISO-X
		BLM VRM Rating	Class IV
Geology and Soils	**SMALL to MODERATE**	Rock and Soil Excavated (cubic yards)	560,234 – TRISO-X
		Backfill Needed (cubic yards)	362,661 – TRISO-X
Water Resources	**SMALL to MODERATE**	Effluent Discharge	Stormwater runoff, treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	600,000 – GNF-A 120,000 – CFFF
		Floodplains	Framatome – none present GNF-A – none present CFFF – located within flood basin of Congaree River BWXT – 11 major flooding events since 1771 TRISO-X – none present within vicinity of facility
Air Quality [(c)]	**SMALL**	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Potential exceedances of PM_{10} and $PM_{2.5}$ NAAQS.

Table A-8. Fuel Fabrication – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment [(a)]***	***Impact Indicator***	***Key Information [(b)]***
			Implementation of fugitive dust controls would mitigate impacts to below NAAQS levels.
		Operations emissions	No exceedances of NAAQS at any evaluated site.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	SMALL – Framatome SMALL to MODERATE – GNF-A SMALL to MODERATE – CFFF None – BWXT SMALL – TRISO-X
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP property potentially disturbed or impacted	No NRHP properties for GNF-A, BWXT, and TRISO-X Evidence exists – CFFF
		Potential for impacts on Traditional Cultural Property (TCP)	None identified for Framatome GNF-A, CFFF, BWXT, and TRISO-X
Infrastructure	**SMALL**	Fuel Use	112 million cubic ft per year natural gas and 1.1 million gpy diesel for CFFF 65 million cubic ft per year natural gas for TRISO-X
		Water Use	See Water Resources
Noise	**SMALL**	Distance to Off-Site Receptor (miles)	1.5 – Framatome 0.4 – GNF-A 0.6 – CFFF 0.5 – BWXT 0.6 – TRISO-X
		Noise Levels	Framatome – 40 to 55 dBA daytime noise levels during operations at fenceline. CFFF and BWXT – mitigated by distance. GNF-A – sound levels ranged from 38.0 to 64.5 decibels. TRISO-X – 50.7 to 59.3 dBA at the adjacent receptors during operations.
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique or problematic waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational	**SMALL**	Occupational Risk	Max lost-time incident rate of 1.75 – Framatome Max DART Rate of 0.75 – GNF-A

Table A-8. Fuel Fabrication – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment*** [(a)]	***Impact Indicator***	***Key Information*** [(b)]
Health – Normal Operations			Average incident rate of 7.3 – BWXT 0.02 per year – TRISO-X
		Construction Radiological Impacts (mrem/yr)	Worker: 10.5 – GNF-A No impacts to the public.
		Operations Average Worker Dose (mrem/yr)	65 – Framatome 85 – GNF-A 226 – CFFF 50 – BWXT
		Operations MEI Public Dose (mrem/yr)	0.012 – Framatome 0.2 – CFFF 0.65 – BWXT
		Operations Population Dose (person-rem/yr)	0.07 – TRISO-X
		Operations Chemical Risk	Hazards to workers addressed through facility safety and health programs.
Public and Occupational Health – Accidents	**SMALL to MODERATE**	Radiological Accidents	Criticality could be fatal to the involved worker. Accident dose of less than 7 rem at the closest location of public access to the site boundary. (CFFF analysis)
		Chemical Accidents	Nitric acid spill inside the fuel fabrication building could exceed AEGL-2 limit of 7.2 mg/m^3 for the public. (TRISO-X analysis) Methyltrichlorosilane spill outside the fuel fabrication building could exceed AEGL-2 limit of 7.3 ppm for the public. (TRISO-X analysis)
Traffic	**SMALL to MODERATE**	Construction – Daily Vehicle Trips: Workers/Trucks	268/24 – TRISO-X
		Operations – Daily Vehicle Trips: Workers/Trucks	1,400 – Framatome 4,200 – GNF-A 2,276 – CFFF 4,800 – BWXT 1,640 – TRISO-X
Socioeconomics	**SMALL to MODERATE**	Peak Construction Employment (direct)	134 – TRISO-X
		Operations Employment (direct)	700 – Framatome 2,100 – GNF-A 1,138 – CFFF 2,400 – BWXT 816 – TRISO-X
		ROI Labor Force	141,394 – Framatome 204,807 – GNF-A

Table A-8. Fuel Fabrication – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
			110,000 – BWXT 331,692 – TRISO-X
Environmental Justice	**SMALL to MODERATE- No disproportionate and adverse impacts on communities with environmental justice concerns are expected.**	Minority or low-income population in ROI	Communities with environmental justice concerns near GNF-A and CFFF Communities with environmental justice concerns within 4 miles from TRISO-X

Key: AEGL = Acute Exposure Guideline Levels; BLM VRM = Bureau of Land Management Visual Resources Management; BWXT = BWX Technologies, Inc.; CFFF = Columbia Fuel Fabrication Facility; DART = days away, restricted, or on-the-job transfer; dBA = A-weighted decibels; FFF = fuel fabrication facility; ft = feet; GNF-A = Global Nuclear Fuel – Americas; gpd =gallons per day; gpy =gallons per year; HALEU = high-assay low-enriched uranium; LLW = low-level waste; MEI = maximally exposed individual; mg/m^3 = milligram per cubic meters; MLLW = mixed low-level waste; mrem = millirem; NAAQS = National Ambient Air Quality Standards; NEPA = National Environmental Policy Act; NRHP = National Register of Historic Places; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter (fine particulates); PM_{10} = particulate matter less than or equal to 10 microns in diameter (coarse particulates); ppm = parts per million; ROI = region of influence; yr = year

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site.

[b] Details regarding the impacts of constructing and operating a fuel fabrication facility to support HALEU production were developed from relevant NEPA documentation listed in Section A.7.1.2.2, *Existing NEPA Documentation* (Leidos, 2023).

[c] The impacts of greenhouse gases are evaluated in EIS Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.7.2 Construction and Operation of Reactors

HALEU could be used to power ANRs. Commercial HALEU-fueled reactors would be licensed by the NRC.

A.7.2.1 Analysis Methodology

A.7.2.1.1 Approach to NEPA Analyses

Environmental impacts associated with the construction and operation of ANRs is incorporated from the NRC's ANR GEIS. The purpose and need for the ANR GEIS is to present impact analyses for the environmental issues common to ANRs that can be addressed generically and eliminate reproducing the same analyses each time a licensing application is submitted. Use of the ANR GEIS allows future environmental review efforts to focus on issues that can be resolved only once a site is identified. This ANR GEIS is intended to improve the efficiency of licensing ANRs by (1) identifying the types of potential environmental impacts of building, operating, and decommissioning an ANR, (2) assessing impacts that are expected to be generic (the same or similar) for many or most ANRs, and (3) defining the environmental issues that will need to be addressed in project-specific supplemental EISs addressing specific projects.

A.7.2.1.2 Existing NEPA Documentation

Any of the advanced reactor designs might fit within the Plant Parameter Envelope (PPE) and Site Parameter Envelope (SPE) described in the *Generic Environmental Impact Statement for Advanced*

Nuclear Reactors - Draft Report for Comment (NRC, 2021c)[16] (referred to as the "ANR GEIS"). The ANR GEIS can provide partial NEPA coverage for reactors that fall within the range of parameters analyzed (allows applicant for license to refer to the ANR GEIS without further analysis if parameters are met).

A.7.2.2 Potential Environmental Consequences

It is likely that most advanced reactors would be designed to fit within PPE and SPE developed in the ANR GEIS. The ANR GEIS shows that environmental consequences for an ANR are expected to range from SMALL to MODERATE. Reactor-specific analyses would provide NEPA coverage for issues not covered by the ANR GEIS analyses.

DOE's evaluation of potential impacts of construction and operation of HALEU-fueled reactors is based on the ANR GEIS (NRC, 2021c). The Draft ANR GEIS evaluates the potential environmental impacts of 121 issues relevant to constructing, operating, and decommissioning of ANRs. The 121 issues are spread across 20 topics that correspond to the resource areas and other topics evaluated in an EIS. The Draft ANR GEIS identifies 100 issues as "Category 1" issues, 19 issues as "Category 2" issues, and 2 issues that are uncertain which are neither Category 1 nor Category 2.

Category 1 issues are those that the NRC staff has preliminarily determined that a generic conclusion regarding the potential environmental impacts of issuing a permit or license for an ANR can be reached, provided that the project is bounded by relevant PPE[17] and SPE[18] values and assumptions. Additionally, Category 1 issues are those that the NRC staff has preliminarily determined will result in no more than a SMALL adverse impact or will have a beneficial impact.

The Draft ANR GEIS identifies 19 issues as Category 2 issues, which are those that the NRC staff has preliminarily determined cannot be resolved generically and for which the NRC staff, in its Draft Supplemental EIS,[19] must analyze in detail. Five of the 19 issues (i.e., purpose and need, need for power, site alternatives, energy alternatives, and system design alternatives) are not related to environmental impacts, which leaves 14 issues of concern.

The 14 Category 2 issues that the NRC has determined it will need to evaluate on a project- and site-specific basis are listed below (NRC, 2021c):

1. Operations impacts on surface water quality degradation due to chemical and thermal discharges
2. Construction impacts on important terrestrial species and habitats—resources regulated under the Endangered Species Act (16 U.S.C. 1531–1544)
3. Operations impacts on important terrestrial species and habitats—resources regulated under the Endangered Species Act
4. Construction impacts on important aquatic species and habitats—resources regulated under the Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.) (the "Magnuson-Stevens Act")

[16] The *Generic Environmental Impact Statement for Advanced Nuclear Reactors - Draft Report for Comment* (NRC, 2021c) is an internal NRC review draft, but represents the best available information and therefore was used in preparing the HALEU EIS.

[17] The PPE is a set of reactor and owner engineered parameters that are expected to bound the characteristics of a reactor that might be deployed.

[18] The SPE is a set of site parameters that are expected to bound the characteristics of a site where a reactor might be deployed.

[19] An NRC Supplemental EIS would be prepared for a specific reactor. A Supplemental EIS would tier from the ANR GEIS.

5. Operations thermal impacts on aquatic biota
6. Operations impacts and other effects of cooling-water discharges on aquatic biota
7. Operations impacts on important aquatic species and habitats—resources regulated under the Endangered Species Act and Magnuson-Stevens Act
8. Construction impacts on historic and cultural resources
9. Operation impacts on historic and cultural resources
10. Severe accidents
11. Construction environmental justice impacts
12. Operation environmental justice impacts
13. Climate change
14. Cumulative impacts

Finally, there are two issues related to electromagnetic fields that are designated as N/A (i.e., impacts are uncertain), which are neither Category 1 nor Category 2. The two issues that are uncertain, currently cannot be evaluated because the relationship of these issues to their impacts is uncertain.

Therefore, it is likely that most issues (100 of 121 issues evaluated in the Draft ANR GEIS) arising from construction and operation of HALEU-fueled reactors would be Category 1 issues with SMALL impacts, and as described above, only 14 issues would need to be evaluated by the NRC on a project- and site-specific basis. In any event, project-specific NEPA documentation would be prepared by the NRC before any HALEU-fueled reactors are constructed and operated.

Additionally, two PPEs were developed to facilitate environmental reviews of potential future advanced reactor demonstration projects for two size ranges: (1) microreactors, which are defined as single units with outputs of 60 megawatts thermal (MWt) or less, and (2) small- to medium-sized advanced reactors with outputs from 60 MWt up to 1,000 MWt (McDowell & Goodman, 2021). The methodology for developing the PPEs included reactor vendor responses to questionnaires, input from Idaho National Laboratory staff, independent assessments by subject matter experts, and a review of regulatory requirements a vendor would have to meet during construction and operation.

HALEU could also be used in demonstration and test reactors, and for isotope production. The use of HALEU fuel in existing demonstration, test, and isotope production reactors would be within the authorized operating envelope for the reactors and is not likely to appreciably change the environmental impacts of operation of the reactors. For new demonstration, test, and isotope production reactors, the impacts would be expected to be similar to those described above for new HALEU-fueled reactors in general.

The summary of potential impact assessments for construction and operation of reactors that use HALEU fuel is presented in Table A-9. Details regarding advanced reactor operations using HALEU fuel were developed from a range of key impact indicators analyzed in the ANR GEIS and the sources cited therein. Characteristics associated with microreactor and small- to medium-sized ANR technologies and resource needs are based on Tables E.1 and E.2 of a report from the National Reactor Innovation Center (McDowell & Goodman, 2021; Leidos, 2023). The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-9 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences among the types of reactors are noted.

Table A-9. Reactor Construction and Operations – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment*** [(a)]	***Impact Indicator***	***Key Information*** [(b)]
Land Use	**SMALL**	Land Disturbed (acres)	18 – micro 50 – small to medium
		Site Size (acres)	36 – micro 100 – small to medium
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL**	Tallest Substantial Structure (other than met/T-line towers)	50 ft – stack micro 87 ft – stack small to medium
		Distance to Nearest Receptor (miles)	0.5
		BLM VRM Rating	Site specific
Geology and Soils	**SMALL**	Rock and Soil Excavated	20 ft maximum depth of excavation micro 155 ft maximum depth of excavation small to medium
		Backfill Needed	Unlikely to need large quantities due to size of construction area
Water Resources	**SMALL except undetermined for surface water quality**	Effluent Discharge	Stormwater runoff and treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	648,000 to 8.42 M (450 gpm micro and 5,850 gpm small to medium)
		Floodplains	No
Air Quality [(c)]	**SMALL**	NAAQS Attainment Status	Site specific
		Construction emissions	Emission of criteria pollutants are less than de minimis levels. Implementation of fugitive dust controls would ensure that impacts remain below NAAQS levels.
		Operations emissions	Emission of criteria pollutants are less than de minimis levels. Emission controls and regulatory compliance required by a state permit and the NRC would limit emissions to acceptable levels and less than the NAAQS.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	ANR GEIS (NRC, 2021c) (Table 1-1) found 29 Category 1 ecological resource issues with SMALL impacts, and 6 Category 2 ecological resource issues that

Table A-9. Reactor Construction and Operations – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment*** [(a)]	***Impact Indicator***	***Key Information*** [(b)]
			would require site-specific analysis.
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP property potentially disturbed or impacted	ANR GEIS (NRC, 2021c) (Table 1-1) found two Category 2 cultural resource issues that would require site-specific analysis.
		Potential for impacts on Traditional Cultural Property (TCP)	Site specific
Infrastructure	**SMALL**	Electrical Use	Power reactors are net generators of electricity.
		Water Use	See Water Resources
		Fuel Use	Minor amounts for vehicles and backup generators
Noise	**SMALL**	Distance to Off-Site Receptor (miles)	Site specific
		Noise Levels	65 dBA at site boundary
Waste Management	SMALL	SNF (MTU)	290
		LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique or problematic waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL except uncertain for EMF**	Occupational Risk	SMALL
		Construction Radiological Impacts (mrem/yr)	SMALL
		Operations Average Worker Dose (mrem/yr)	SMALL
		Operations MEI Public Dose (mrem/yr)	SMALL
		Operations Population Dose (person-rem/yr)	SMALL
		Operations Chemical Risk	SMALL
Public and Occupational Health – Accidents	**SMALL except undetermined for severe accidents**	Radiological Accidents	SMALL for design basis accidents. Undetermined for severe accidents.
		Chemical Accidents	SMALL – inventories of regulated substances are less than threshold quantities
Traffic	**Undetermined**	Construction – Daily Vehicle Trips: Workers/Trucks	300 – micro 2,800 – small to medium (truck data not available)
		Operations – Daily Vehicle Trips: Workers/Trucks	300 – micro 826 – small to medium

Table A-9. Reactor Construction and Operations – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment (a)*	*Impact Indicator*	*Key Information (b)*
			(truck data not available)
Socioeconomics	**SMALL or Beneficial**	Peak Construction Employment (direct)	150 – micro 909 – small to medium
		Operations Employment (direct)	100 – micro 413 – small to medium
		ROI Labor Force	Site specific
Environmental Justice	**Undetermined**	Minority or low-income population in ROI	Site specific

Key: ANR = Advanced Nuclear Reactor; BLM VRM = Bureau of Land Management Visual Resources Management; dBA = A-weighted decibels; EMF = electromagnetic field; ft = feet; gpd = gallons per day; gpm = gallons per minute; HALEU = high-assay low-enriched uranium; LLW = low-level waste; MEI = maximally exposed individual; micro = microreactor; MLLW = mixed low-level waste; mrem = millirem; MTU = metric tons of uranium; NAAQS = National Ambient Air Quality Standards; NRC = U.S. Nuclear Regulatory Commission; NRHP = National Register of Historic Places; ROI = region of influence; SNF = spent nuclear fuel; yr = year

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site.

[b] Details regarding constructing and operating a reactor using HALEU fuel were developed from relevant documentation listed in Section A.7.2.1.2, *Existing NEPA Documentation* (Leidos, 2023).

[c] The impacts of greenhouse gases are evaluated in EIS Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.7.3 Spent Nuclear Fuel Storage and Disposition

A.7.3.1 Analysis Methodology

A.7.3.1.1 Approach to NEPA Analysis

Environmental impacts associated with spent fuel storage and disposition are incorporated from the NRC *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC, 2014c) (the "SNF Storage GEIS"). The assessment of impacts did consider the relatively small amount[20] of SNF potentially generated from the use of the HALEU produced (up to 290 MT in metallic form) as part of the Proposed Action. The NRC considers the continued storage of SNF an activity that is similar for all commercial nuclear power plants and storage facilities. Therefore, a generic analysis was an appropriate, effective, and efficient method of evaluating the environmental impacts of continued storage. The SNF Storage GEIS looked at the environmental impacts of continued storage of SNF at single- and multiple-reactor nuclear power plant sites, in spent fuel pools, at-reactor independent spent fuel storage installations (i.e., ISFSIs), and away-from-reactor ISFSIs. In addition to existing reactor designs and conventional SNF, the NRC also considered reactor and fuel technologies such as mixed oxide fuel and small modular reactors.

Because the timing of repository availability is uncertain, the SNF Storage GEIS analyzed potential environmental impacts over three possible timeframes: a short-term timeframe, which includes 60 years of continued storage after the end of a reactor's licensed life for operation; an additional 100-year timeframe (60 years plus 100 years) to address the potential for delay in repository availability; and a

[20] Compared to a single LWR lifetime generation of 1,200 to 1,600 MT and off-site consolidated storage of more than 40,000 MT of SNF (NRC, 2014c).

third, indefinite timeframe to address the possibility that a repository never becomes available. All potential impacts in each resource area were analyzed for each continued storage timeframe.

A.7.3.1.2 Existing NEPA Documentation

The SNF Storage GEIS was used to extrapolate the potential environmental consequences of storage of HALEU SNF at the reactor, as described in the Approach to NEPA Analysis section above:

- *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel, NUREG-2157* (NRC, 2014c)

The NRC EISs for construction and operating of two Consolidated Interim Storage Facilities (CISFs) for SNF were used to extrapolate the potential environmental consequences of storage of HALEU SNF at CISFs:

- *Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas, NUREG-2239* (NRC, 2021e)
- *Environmental Impact Statement for the Holtec International's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Lea County, New Mexico, NUREG-2237* (NRC, 2020)

A.7.3.2 Potential Environmental Consequences

A.7.3.2.1 Storage of Spent Nuclear Fuel at the Reactor

In August 2014, the NRC published the *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC, 2014c). The NRC considers the continued storage of SNF an activity that is similar for all commercial nuclear power plants and storage facilities. Therefore, a generic analysis was an appropriate, effective, and efficient method of evaluating the environmental impacts of continued storage. Because the timing of repository availability is uncertain, the SNF Storage GEIS analyzed potential environmental impacts over three possible timeframes: a short-term timeframe, which includes 60 years of continued storage after the end of a reactor's licensed life for operation; an additional 100-year timeframe (60 years plus 100 years) to address the potential for delay in repository availability; and a third, indefinite timeframe to address the possibility that a repository never becomes available.

Table A-10 provides a summary of impacts for the three storage scenarios for each resource area, including those that were determined to experience only SMALL impacts (e.g., land use). The resource areas that could have the potential for MODERATE to LARGE environmental consequences (depending on location) are discussed in Section A.7.3.2.1.1, *Ecological Resources,* Section A.7.3.2.1.2, *Historic and Cultural Resources*, and Section A.7.3.2.1.3, *Waste Management – Nonradioactive Waste*, to provide more information on those resources.

Table A-10. At-Reactor Storage of Spent Nuclear Fuel – Summary of Impacts by Resource Area

Resource Area	***Short-Term Storage (60 years)***	***Long-Term Storage (160 years)***	***Indefinite Storage***
Land Use	SMALL	SMALL	SMALL
Socioeconomics	SMALL	SMALL	SMALL
Environmental Justice	Disproportionate and adverse impacts are not expected.		
Air Quality	SMALL	SMALL	SMALL
Climate Change	SMALL	SMALL	SMALL
Geology and Soils	SMALL	SMALL	SMALL
Surface Water: Quality	SMALL	SMALL	SMALL

Table A-10. At-Reactor Storage of Spent Nuclear Fuel – Summary of Impacts by Resource Area

Resource Area	***Short-Term Storage (60 years)***	***Long-Term Storage (160 years)***	***Indefinite Storage***
Surface Water: Consumptive Use	SMALL	SMALL	SMALL
Groundwater: Quality	SMALL	SMALL	SMALL
Groundwater: Consumptive Use	SMALL	SMALL	SMALL
Terrestrial Resources	SMALL	SMALL	SMALL
Aquatic Ecology	SMALL	SMALL	SMALL
Special Status Species and Habitat	Impacts for federally listed threatened and endangered species and Essential Fish Habitat would be determined as part of the consultations for the Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Management Act.		
Historic and Cultural Resources	SMALL	SMALL to LARGE	SMALL to LARGE
Noise	SMALL	SMALL	SMALL
Aesthetics	SMALL	SMALL	SMALL
Waste Management: Low-Level Waste	SMALL	SMALL	SMALL
Waste Management: Mixed Waste	SMALL	SMALL	SMALL
Waste Management: Nonradioactive Waste	SMALL	SMALL	SMALL to MODERATE
Transportation	SMALL	SMALL	SMALL
Public and Occupational Health	SMALL	SMALL	SMALL
Accidents	SMALL	SMALL	SMALL
Sabotage or Terrorism	SMALL	SMALL	SMALL

Source: (NRC, 2014c)

A.7.3.2.1.1 Ecological Resources

Short-Term Storage. If continued operation of an ISFSI or spent fuel pool could affect federally listed species or designated critical habitat, and the criteria are met in 50 CFR 402 for initiation or reinitiation of Endangered Species Act Section 7 consultation, the NRC would be required to initiate or reinitiate Section 7 consultation with the National Marine Fisheries Services or the USFWS. With regard to spent fuel pools, impacts on state-listed species and marine mammals would most likely be less than those experienced during the licensed life for operation of the reactor because of the smaller size of the spent fuel pool's cooling system and lower water demands when compared to those of an operating reactor. With regard to dry cask storage of spent fuel, given the small size and ability to site ISFSI facilities away from sensitive ecological resources, the NRC concluded that continued storage of spent fuel in at-reactor ISFSIs would likely have minimal impacts on state-listed species, marine mammals, migratory birds, and bald and golden eagles (NRC, 2014c).

Long-Term Storage. In addition to routine maintenance and monitoring of ISFSIs, impacts from the construction of a dry transfer system (DTS) and replacement of the DTS and ISFSIs on special status species and habitat would be minimal because of the small size of the ISFSI and DTS facilities and because no water is required for cooling. The NRC assumed that the ISFSI and DTS facilities could be sited to avoid listed species and critical habitat because of the small size of the construction footprint and sufficient amount of previously disturbed areas on most nuclear power plant sites. Therefore, the NRC concluded that construction of a DTS and the replacement of the DTS and ISFSI would likely have minimal impacts on state-listed species, marine mammals, migratory birds, and bald and golden eagles. In the unlikely situation that the continued operation of an ISFSI could affect federally listed species or designated critical habitat, and if the criteria are met in 50 CFR 402 for initiation or reinitiation of Endangered Species Act Section 7 consultation, then the NRC would be required to initiate or reinitiate Section 7 consultation with the National Marine Fisheries Services or USFWS (NRC, 2014c).

Indefinite Storage. Impacts from indefinite storage on state-listed species, marine mammals, migratory birds, and bald and golden eagles would be minimal. The same consultation and any associated mitigation requirements described for the long-term storage timeframe would apply to the construction of the DTS and replacement of the DTS and ISFSI facilities during indefinite storage. In the unlikely situation that the continued operation of an ISFSI could affect federally listed species or designated critical habitat, and if the criteria are met in 50 CFR 402 for initiation or reinitiation of Endangered Species Act Section 7 consultation, the NRC would be required to initiate or reinitiate Section 7 consultation with the National Marine Fisheries Services or USFWS (NRC, 2014c).

A.7.3.2.1.2 Historic and Cultural Resources

Long-Term Storage. Impacts would be SMALL to LARGE. Impacts from continued operations and routine maintenance are expected to be SMALL during the long-term storage timeframe, similar to those described in the short-term storage timeframe. NRC authorization to construct and operate a DTS and to replace a specifically licensed at-reactor ISFSI and DTS would constitute Federal actions under NEPA and would require site-specific environmental reviews and compliance with the National Historic Preservation Act of 1966 before making a decision on the licensing action (NRC, 2014c).

For generally licensed ISFSIs, impacts could be avoided, minimized or mitigated if the licensee has management plans or procedures that require consideration of these resources prior to ground-disturbing activities. The NRC assumed that the replacement of the at-reactor ISFSI and DTS would be constructed on land near the existing facilities. As discussed below, the NRC recognizes that there is uncertainty associated with the degree of prior disturbance and the resources, if any, present in areas where future ground-disturbing activities (i.e., initial and replacement DTS and replacement ISFSI) could occur (NRC, 2014c).

It is possible that historic and cultural resources would be affected by construction activities during the long-term timeframe because the initial ISFSI could be located within a less-disturbed area with historic and cultural resources. Further, the analysis considers uncertainties inherent in analyzing this resource area over long timeframes. These uncertainties include any future discovery of historic and cultural resources; resources that gain significance within the vicinity and the viewshed (e.g., nomination of a historic district) due to improvements in knowledge, technology, and excavation techniques. Therefore, the potential impacts to historic and cultural resources would be SMALL to LARGE. This range takes into consideration routine maintenance and monitoring (i.e., no ground-disturbing activities), the absence or avoidance of historic and cultural resources, and potential ground-disturbing activities that could impact historic and cultural resources. If construction of a DTS and replacement of the ISFSI and DTS occurs in an area with no historic or cultural resource present or construction occurs in previously a disturbed area that allows avoidance of historic and cultural resources then impacts would be SMALL. By contrast, a MODERATE or LARGE impact could result if historic and cultural resources are present at a site and, because they cannot be avoided, are impacted by ground-disturbing activities during the long-term timeframe (NRC, 2014c).

Indefinite Storage. Impacts would be SMALL to LARGE. Impacts regarding the replacement of the ISFSI and DTS would be similar to those described in the long-term storage timeframe. The NRC assumed that replacement at-reactor ISFSI and DTS would be constructed on land near the existing facilities. As stated in Section 1.8 of the SNF Storage GEIS, the NRC assumed that the land where the original facilities were constructed will be available for replacement facility construction; however, the NRC cannot eliminate the possibility that historic and cultural resources would be affected by construction activities during the indefinite timeframe because the initial and replacement ISFSIs and DTS could be located within a less disturbed area with historic and cultural resources in close proximity. Further, the analysis also considers the uncertainties inherent in analyzing this resource area over long timeframes. These uncertainties include any future discovery of historic and cultural resources; resources that gain significance within the vicinity and the viewshed (e.g., nomination of a historic district) due to improvements in knowledge, technology, and excavation techniques. Impacts to historic and cultural resources would be SMALL to LARGE. This range takes into consideration routine maintenance and monitoring (i.e., no ground-disturbing activities), the absence or avoidance of historic and cultural resources, and potential ground-disturbing activities that could impact historic and cultural resources. If construction of a DTS and replacement of the ISFSI and DTS occurs in an area with no historic or cultural resource present or construction occurs in previously a disturbed area that allows avoidance of historic and cultural resources then impacts would be SMALL. By contrast, a MODERATE or LARGE impact could result if historic and cultural resources are present at a site and, because they cannot be avoided, are impacted by ground-disturbing activities during the indefinite timeframe (NRC, 2014c).

A.7.3.2.1.3 Waste Management – Nonradioactive Waste

Indefinite Storage. Impacts would be SMALL to MODERATE. It is expected that sufficient low-level waste disposal capacity would be made available when needed. A relatively small quantity of mixed waste would be generated from indefinite storage and proper management and disposal regulations would be followed. The amount of nonradioactive waste that would be generated and impacts to nonradioactive waste landfill capacity are difficult to accurately estimate for the indefinite storage timeframe and therefore could result in SMALL to MODERATE impacts (NRC, 2014c).

A.7.3.2.2 Consolidated Interim Storage Facilities for Spent Nuclear Fuel

In July 2021, the NRC published NUREG-2239, *Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas* (NRC, 2021e).

In July 2022, the NRC published NUREG-2237, *Environmental Impact Statement for the Holtec International's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Lea County, New Mexico* (NRC, 2020). Disposal of Spent Nuclear Fuel

The program for a geologic repository for SNF at Yucca Mountain, Nevada, has been terminated. Notwithstanding the decision to terminate the Yucca Mountain Nuclear Waste Repository Program, DOE remains committed to meeting its obligations to manage and, ultimately, dispose of SNF (DOE, 2022). In the interim, as described above, SNF can be safely stored.

A.7.3.3 Conclusions

Storage of SNF at the reactor would have SMALL impacts for most resource areas. As described in this section, there is the potential for MODERATE to LARGE impacts on special status species and habitat, historic and cultural resources, and SMALL to MODERATE impacts from nonradioactive waste management (NRC, 2014c).

The total HALEU SNF generated by the implementation of the Proposed Action would contain 290 MT of HALEU. This is 0.4% of the 86,584 MT heavy metal of SNF in inventory in the United States in 2021 (DOE, 2021, p. 2). Therefore, the HALEU SNF generated would not substantially add to the overall impacts of managing the nation's inventory of SNF.

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APPENDIX B – FACILITY NEPA DOCUMENTATION

List of Figures

No figures are presented in this section.

List of Tables

Acronyms and Abbreviations

%	percent
<	less than
HALEU	high-assay low-enriched uranium
ISR	in-situ recovery
LEU	low-enriched uranium
NEPA	National Environmental Policy Act
NRC	U.S. Nuclear Regulatory Commission
SNF	spent nuclear fuel
U-235	uranium-235
U_3O_8	triuranium octoxide
UF_6	uranium hexafluoride
U.S.	United States

Appendix B Facility NEPA Documentation

B.1 Assessment of the NEPA Status of Potential HALEU Facilities

The potential existing and new United States (U.S.) Nuclear Regulatory Commission (NRC) and Agreement State-licensed and other permitted uranium fuel cycle facilities (referred to throughout as "existing facilities") that might support the Proposed Action were reviewed to determine the extent of the existing National Environmental Policy Act (NEPA) coverage for those activities. The extent of existing NEPA coverage was determined using the following judgements:

- **Full coverage** = indicates the existing NEPA documentation covers substantially the same activities that would occur to accomplish a discrete portion of the Proposed Action. In some cases, the amount of material to be processed is unknown, so it cannot be determined if the NEPA documentation covers the total amount of material to be processed.
- **Planned** = indicates that NEPA documentation has not been prepared (or has yet to be completed), but an action has occurred to move toward the stated high-assay low-enriched uranium (HALEU) activity goal. For example, a license application could be in process or may have been submitted to NRC.
- **Proposed** = indicates that NEPA documentation has not been prepared, but there is a statement of a proposal to move toward a stated HALEU activity goal.
- **Partial Coverage** = indicates the existing NEPA documentation covers some, but not all, of the same activities that would occur under the Proposed Action.

The details of the evaluation of NEPA documents are provided in Table B-1 through Table B-17. In the tables, "Full Coverage" is used when the HALEU-related activity is covered by the existing NEPA analysis. This indicates that the activity, or a similar activity, was evaluated in the NEPA document, such that the annual impacts of the activity would likely be bounded. This does not indicate that total impacts would be covered because the total amount of material processed may exceed the amount of material evaluated.

In summary, the status of NEPA coverage for HALEU fuel production activities is as follows for commercial activities:

- Uranium mining, milling, and in-situ recovery (ISR), and the production of uranium oxide (yellowcake, U_3O_8), at existing U.S. commercial facilities has NEPA coverage.
- Commercial conversion of uranium oxide to uranium hexafluoride (UF_6) has NEPA coverage.
- Commercial enrichment to low-enriched uranium (LEU) (less than [<] 5 percent [%] uranium-235 [U-235]) has NEPA coverage.
- Commercial enrichment to HALEU (19.75% to < 20% U-235) has some NEPA coverage, primarily for demonstration quantities of HALEU.
- HALEU enrichment facilities capable of operating at commercially viable throughputs do not have NEPA coverage, although they would be similar to LEU enrichment facilities.
- Commercial deconversion of HALEU in the form of UF_6 to HALEU metal or oxide does not have coverage.
- A commercial HALEU storage facility does not have NEPA coverage.
- BWXT has some coverage for HALEU fuel fabrication. Other fuel fabrication facilities have NEPA coverage for the fabrication of LEU fuel, but not for HALEU fuel. NEPA coverage for new HALEU

fuel fabrication facilities is in progress, but not yet available. For example, X-energy has submitted a license application with an Environmental Report for a facility to process 8 (expandable to 16) metric tons of uranium per year.

- HALEU-fueled reactors have partial NEPA coverage via a Generic Environmental Impact Statement.
- HALEU spent nuclear fuel (SNF) storage has partial NEPA coverage for at-reactor storage via a Generic Environmental Impact Statement, and full NEPA coverage for away-from-reactor storage. HALEU SNF disposition does not have NEPA coverage.
- Transportation of commercial quantities of uranium ore, uranium oxide, UF_6, and HALEU have partial coverage in existing NEPA documents.

Table B-1. Nuclear Regulatory Commission NEPA Documentation – Generic

<table>
<tr><th>Activity</th><th>Document #</th><th>Title</th><th>Link</th></tr>
<tr><td rowspan="2">Generic NEPA Coverage for HALEU-Fueled Reactors</td><td>(NRC, 2021a)
NUREG-2249</td><td>Draft Generic Environmental Impact Statement for Advanced Nuclear Reactors (ANRs)</td><td>https://www.nrc.gov/reactors/new-reactors/advanced/rulemaking-and-guidance/advanced-reactor-generic-environmental-impact-statement-geis.html

https://www.regulations.gov/document/NRC-2020-0101-0033</td></tr>
<tr><td colspan="3">Analysis of NEPA Documentation: Partial Coverage – The purpose and need for this GEIS is to present impact analyses for the environmental issues common to many or most ANRs that can be addressed generically, thereby eliminating the need to repeatedly reproduce the same analyses each time a licensing application is submitted and allowing applicants and NRC staff to focus future environmental review efforts on issues that can be resolved only once a site is identified. This GEIS is intended to improve the efficiency of licensing ANRs by (1) identifying the possible types of environmental impacts of building, operating, and decommissioning an ANR; (2) assessing impacts that are expected to be generic (the same or similar) for many or most ANRs; and (3) defining the environmental issues that will need to be addressed in project-specific supplemental EISs addressing specific projects.

The NRC staff have evaluated fuel cycle impacts for light water reactors, as documented in 10 CFR 51.51 (10 CFR Part 51-TN250), Table S-3, Table of Uranium Fuel Cycle Environmental Data. Fuel cycle impacts include uranium mining, uranium milling, UF_6 production, uranium enrichment, fuel fabrication, reprocessing, and disposal. Section 3.14 of the GEIS evaluated the fuel cycle impacts for ANRs and determined that data from Table S-3 could bound the impacts of the fuel cycle for certain advanced reactors. An applicant for an advanced reactor license could meet the requirements of 10 CFR 51.50(b)(3) and 10 CFR 51.50(c) by demonstrating that their fuel falls within the fuel cycle analysis in this GEIS.

The GEIS NEPA documentation for new ANRs should be largely applicable to determining the potential impacts of construction and operation of new ANRs using HALEU fuel. Portions of the GEIS that evaluate uranium fuel cycle impacts should also be applicable.</td></tr>
<tr><td rowspan="2">Generic NEPA Coverage for Storage of HALEU SNF</td><td>(NRC, 2014c)
NUREG-2157</td><td>Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel</td><td>https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr2157/index.html</td></tr>
<tr><td colspan="3">Analysis of NEPA Documentation: Partial Coverage – The GEIS analyzes the environmental impacts of continued storage of SNF. The NRC has looked at the direct, indirect, and cumulative effects of continued storage for three timeframes: (1) short term, (2) long term, and (3) indefinite. The NRC is evaluating the continued storage of commercial SNF in this GEIS. Thus, certain topics are not addressed because they are not within the scope of this review. These topics include (1) noncommercial SNF (e.g., defense SNF); (2) commercial HLW generated from reprocessing; (3) GTCC LLW; (4) foreign SNF stored in the United States; and (5) nonpower reactor SNF (e.g., test and research reactors, including foreign generated SNF stored in the United States).

Because the GEIS states that topics such as noncommercial SNF (e.g., defense SNF); foreign SNF stored in the United States; and nonpower reactor SNF (e.g., test and research reactors, including foreign generated SNF stored in the United States) are not within the scope of the GEIS analyses, DOE may be able to rely on this document only for NEPA coverage for commercial nuclear power reactor HALEU SNF.</td></tr>
</table>

Table B-1. Nuclear Regulatory Commission NEPA Documentation – Generic

Activity	Document #	Title	Link
Generic NEPA Coverage for Uranium Fuel Cycle	(NRC, 2021b) NUREG-1437	*Generic Environmental Impact Statement for License Renewal of Nuclear Plants*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/index.html
	Analysis of NEPA Documentation: Partial Coverage – The GEIS for license renewal of nuclear power plants was undertaken to assess the environmental impacts that could be associated with nuclear power plant license renewal and an additional 20 years of operation of individual plants. The general analytical approach to each environmental issue is to (1) describe the activity that affects the environment, (2) identify the population or resource that is affected, (3) assess the nature and magnitude of the impact on the affected population or resource, (4) characterize the significance of the effect for both beneficial and adverse effects, (5) determine whether the results of the analysis apply to all plants, and (6) consider whether additional mitigation measures would be warranted for impacts that would have the same significance level for all plants. In determining the significance of environmental impacts associated with an issue, a determination was made whether the analysis in the GEIS could be applied to all plants and whether additional mitigation measures would be warranted. The categories to which an issue may be assigned follow. Category 1: For the issue, the analysis reported in the GEIS has shown the following: (1) the environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics; (2) a single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective off-site radiological impacts from the fuel cycle and from high-level-waste and spent-fuel disposal); and (3) mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation. Category 2: For the issue, the analysis reported in the GEIS has shown that one or more of the criteria of Category 1 cannot be met, and therefore, additional plant-specific review is required. This Final GEIS assesses 92 environmental issues. Sixty-eight of these issues are found to be Category 1 and are identified in 10 CFR Part 51 as not requiring additional plant-specific analysis. Because operation of existing power reactors on LEU or LEU+ fuels is outside the scope of the Proposed Action, the NEPA documentation in this document would be largely not applicable. Some areas of discussion on portions of the uranium fuel cycle may be applicable, because HALEU production could, in essence, be tacked on to LEU production. Note: Similar information presented in the *Draft Generic Environmental Impact Statement for Advanced Nuclear Reactors* (NUREG-2249) may be more applicable.		
Generic NEPA Coverage for Uranium Milling	(NRC, 1980) NUREG-0706	*Generic Environmental Impact Statement on Uranium Milling*	https://www.nrc.gov/docs/ML0327/ML032751663
	Analysis of NEPA Documentation: Partial Coverage – This GEIS on uranium milling was prepared to assess the potential environmental impacts of uranium milling operations, in a programmatic context, including the management of uranium mill tailings. In support of this purpose, the principal objective of the statement was to assess the nature and extent of the environmental impacts of conventional uranium milling in the United States from local, regional, and national perspectives on both short- and long-term bases. Conventional uranium milling as used herein refers to the milling of ore mined primarily for the-recovery of uranium. It involves the processes of crushing, grinding, and leaching of the ore, followed by chemical separation and concentration of uranium.		
Generic NEPA Coverage for	(NRC, 2009a) NUREG-1910	*Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/index.html

Table B-1. Nuclear Regulatory Commission NEPA Documentation – Generic

<table>
<tr><th>Activity</th><th>Document #</th><th>Title</th><th>Link</th></tr>
<tr><td>Uranium ISR Mining</td><td colspan="3">Analysis of NEPA Documentation: Full Coverage[21] – The GEIS was prepared to assess the potential environmental impacts associated with the construction, operation, aquifer restoration, and decommissioning of an ISR facility in four specified geographic areas. The intent of the GEIS is to determine which impacts would be essentially the same for all ISR facilities and which ones would result in varying levels of impacts for different facilities, thus requiring further site-specific information to determine the potential impacts. As such, the GEIS provides a starting point for the NRC's NEPA analyses on site-specific license applications for new ISR facilities, as well as for applications to amend or renew existing ISR licenses.

Uranium would be recovered from the ore and converted to U_3O_8. This activity would be performed to supply feed for LEU production, and therefore would be no different than currently licensed activities, as well as expected to be within the current license parameters and GEIS NEPA documentation. This GEIS provide coverage for ISL/ISR facilities; conventional mining is not covered.</td></tr>
<tr><td rowspan="2">Generic NEPA Coverage for Transportation of Radioactive Materials</td><td>(NRC, 1977)
NUREG 0170</td><td>Final Environmental Impact Statement on the Transportation of Radioactive Materials by Air and Other Modes</td><td>https://www.nrc.gov/docs/ML1219/ML12192A283.pdf</td></tr>
<tr><td colspan="3">Analysis of NEPA Documentation: Partial Coverage – This document is an assessment of the environmental impact from transportation of shipments of radioactive material into, within, and out of the United States. The environmental impact of radioactive material transport can be described in three distinct parts: the radiological impact from normal transport, the risk of radiological effects from accidents involving vehicles carrying radioactive material shipments, and all nonradiological impacts. The NRC EIS evaluates these three aspects for transportation of radioactive materials by air and other modes.</td></tr>
</table>

Key: ANR = advanced nuclear reactor; CFR = Code of Federal Regulations; DOE = U.S. Department of Energy; EIS = Environmental Impact Statement; GEIS = Generic EIS; GTCC = greater than Class C; HALEU = high-assay low-enriched uranium; HLW = high-level radioactive waste; ISL = in-situ leach; ISR = in-situ recovery; LEU = low-enriched uranium; LEU+ = uranium enriched 5% up to 10%; LLW = low-level radioactive waste; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; SNF = spent nuclear fuel; U_3O_8 = uranium oxide (yellowcake); UF_6 = uranium hexafluoride

Table B-2. Uranium Production – Uranium Mining and Milling using Conventional Processes

<table>
<tr><th>Activity</th><th>Document #</th><th>Title</th><th>Link</th></tr>
<tr><td rowspan="2">Conventional Mining and Milling of Uranium Ore</td><td></td><td>DOE Uranium Leasing Program</td><td>https://www.energy.gov/lm/uranium-leasing-program</td></tr>
<tr><td>(DOE, 2014)
DOE/EIS-0472</td><td>Final Uranium Leasing Program Programmatic</td><td>https://www.energy.gov/lm/final-uranium-leasing-program-peis</td></tr>
</table>

21 In evaluating the applicability of the GEIS NEPA documentation, "Full Coverage" indicates that the NEPA documentation is applicable and additional NEPA documentation is unlikely to be needed for the covered resource areas. A GEIS by nature is not expected to provide NEPA coverage for all potential impacts in all resource areas. This GEIS provides coverage for ISR facilities. Conventional mining is not covered by this GEIS.

Table B-2. Uranium Production – Uranium Mining and Milling using Conventional Processes

Activity	***Document #***	***Title***	***Link***
		Environmental Impact Statement	
	(USDA, 2013)	Draft Environmental Impact Statement for Roca Honda Mine Sections 9, 10, and 16, Township 13 North, Range 8 West, New Mexico Principal Meridian Cibola National Forest, McKinley and Cibola Counties, New Mexico	https://www.govinfo.gov/content/pkg/GOVPUB-A13-PURL-gpo40498/pdf/GOVPUB-A13-PURL-gpo40498.pdf
	(USDA, 2012)	Draft Environmental Impact Statement for the La Jara Mesa Mine Project, Mt. Taylor Ranger District, Cibola National Forest, Cibola County, New Mexico	https://wp-laramide-2023.s3.ca-central-1.amazonaws.com/media/2023/03/Draft_Environmental_Impact_Statement_La_Jara_Mesa_2012.pdf
	Analysis of NEPA Documentation: Partial Coverage – The *DOE Uranium Leasing Program Programmatic Environmental Impact Statement* evaluates the environmental impacts of management alternatives for DOE's Uranium Leasing Program, under which DOE administers tracts of land in western Colorado for exploration, development, and the extraction of uranium and vanadium ores. This EIS include the environmental impacts of alternatives that include construction, operation, and decommissioning of conventional uranium mines and mills. The applicant submitted an application for a New Mine Permit to the New Mexico Mining and Minerals Division, or the proposed Roca Honda Mine – to the Cibola National Forest (U.S. Forest Service) for development of underground uranium mining and surface support facilities on the Mt. Taylor Ranger District near Grants, New Mexico. The applicant proposes a mine permit area of 1,968 acres, including 48 acres of haul roads, utility corridor, and mine dewater discharge pipeline corridor. There are 218 acres of proposed disturbance. This Draft EIS assesses the potential environmental impacts of implementing the proposed plan. The applicant submitted a plan of operations (plan) for development of underground uranium mining and surface support facilities at the La Jara Mesa property at Mt. Taylor near Grants, New Mexico. The plan includes development, operation, and mine reclamation for an overall		

Table B-2. Uranium Production – Uranium Mining and Milling using Conventional Processes

Activity	Document #	Title	Link
	time period of up to 20 years. Disturbance on the 16.4 acres includes improvements to existing roads, construction of a new water pipeline and electric distribution line in the road right-of-way, and an escape raise/air vent at the top of La Jara Mesa, all of which are directly associated with the applicant's plan. This Draft EIS evaluates the potential environmental impacts of implementing the proposed plan.		

Key: DOE = U.S. Department of Energy; EIS = Environmental Impact Statement; NEPA = National Environmental Policy Act; USDA = U.S. Department of Agriculture.

Table B-3. Uranium Production – Uranium Milling

Activity	Document #	Title	Link
Milling of Uranium Ore		White Mesa Uranium Mill	https://deq.utah.gov/waste-management-and-radiation-control/radioactive-materials-license-no-ut1900479-white-mesa-uranium-mill-energy-fuels-resources-usa-inc
	(NRC, 1997)	Environmental Assessment for Renewal of Source Material License No. SUA-1358 Energy Fuels Nuclear, INC. White Mesa Uranium Mill, San Juan County, Utah	https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-1997-001361.pdf
	(NRC, 1979) NUREG-0556	Final Environmental Statement Related to Operation of White Mesa Uranium Project, Energy Fuels Nuclear, Inc.	https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-1979-001081.pdf
	Analysis of NEPA Documentation: Full Coverage – The White Mesa Mill is located in San Juan County, Utah, about 8 km (5 miles) south of Blanding, Utah. The purpose of the 1979 Environmental Statement is to discuss in detail the environmental effects of project construction as well as monitoring and mitigating measures proposed to minimize the effects of the project on the immediate area and surrounding environs. The Proposed Action for the 1997 EA was to renew license SUA-1358 for operation of the White Mesa Mill at a maximum production rate of 4,380 tons of yellowcake per year. Additionally, the applicant is authorized, by license condition, to possess byproduct material in the form of uranium waste tailings and other uranium byproduct waste generated by the milling operations authorized by the renewal license. All operations authorized by the renewed license are conducted within the confines of the existing site boundary. The project site consists of 4,871 acres of private land together with mill site claims. The mill site itself occupies approximately 50 acres and the tailings disposal cells another 450 acres.		

Key: EA = Environmental Assessment; km = kilometers; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission

Table B-4. Uranium Production – Uranium Mining using In-Situ Leach (In-Situ Recovery) Processes

Activity	*Document #*	*Title*	*Link*
ISR of Uranium		NRC-Licensed Uranium Recovery Facilities	https://www.nrc.gov/info-finder/materials/uranium/index.html
	(NRC, 2018) NUREG-1910	Final Environmental Assessment for the Ludeman Satellite In Situ Recovery Project, Converse County, Wyoming	https://www.nrc.gov/docs/ML1818/ML18183A225.pdf
	(NRC, 2016), NUREG-1910, Supplement 6	Environmental Impact Statement for the Reno Creek In Situ Recovery Project in Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, Final Report	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s6/index.html
	(NRC, 2014a), NUREG-1910, Supplement 4, Volume 1	Environmental Impact Statement for the Dewey-Burdock Project in Custer and Fall River Counties, South Dakota: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s4/v1/index.html
	(NRC, 2014b), NUREG-1910, Supplement 5	Environmental Impact Statement for the Ross ISR Project in Crook County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities: Final Report	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s5/index.html
	(NRC, 2011a), NUREG-1910, Supplement 2	Environmental Impact Statement for the Nichols Ranch ISR Project in Campbell and Johnson Counties, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s2/index.html#abs
	(NRC, 2011b), NUREG-1910, Supplement 3	Environmental Impact Statement for the Lost Creek ISR Project in Sweetwater County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s3/index.html
	(NRC, 2010), NUREG-1910, Supplement 1	Environmental Impact Statement for the Moore Ranch ISR Project in Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s1/index.html

Table B-4. Uranium Production – Uranium Mining using In-Situ Leach (In-Situ Recovery) Processes

Activity	*Document #*	*Title*	*Link*
	Analysis of NEPA Documentation: Full Coverage – Uranium would be recovered from the ore and converted to U_3O_8. This activity would be performed to supply feed for LEU production, and therefore would be no different than currently licensed activities, as well as expected to be within the current license parameters and NEPA documentation. These NEPA documents provide coverage for ISL/ISR facilities; conventional mining is not covered.		

Key: ISL = in-situ leach; ISR = in-situ recovery; LEU = low-enriched uranium; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; U_3O_8 = uranium oxide (yellowcake)

Table B-5. Uranium Conversion – ConverDyn (formerly Honeywell), Metropolis, Illinois

Activity	*Document #*	*Title*	*Link*
ConverDyn Conversion of U_3O_8 to 0.711% UF_6		ConverDyn (formerly Honeywell International), Uranium Conversion	https://www.nrc.gov/info-finder/fc/honeywell-works-uranium-conv-il-lc.html?panel=0
	(NRC, 2019)	Environmental Assessment for the Proposed Renewal of Source Material License SUB–526 Metropolis Works Uranium Conversion Facility (Massac County, Illinois)	https://www.nrc.gov/docs/ML1927/ML19273A012.pdf
	(NRC, 1995)	Environmental Assessment for Renewal of Source Material License SUB-526 AlliedSignal, Inc. Metropolis, Illinois	https://www.nrc.gov/docs/ML1623/ML16231A195.pdf
	Analysis of NEPA Documentation: Full Coverage – This plant is currently in "idle-ready" status but plans to restart operations. Plant capacity was 7,000 MTU/yr in 2017. Original plant rated capacity is 15,000 MTU/yr. Uranium oxide ore would be converted to UF_6 as feed to the enrichment facilities. This activity would be performed to supply feed for LEU production, and therefore would be no different than recently licensed activities, as well as expected to be within the current license parameters and NEPA documentation.		

Key: % = percent; LEU = low-enriched uranium; mrem/yr = millirem per year; MTU/yr = metric tons of uranium per year; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; person-rem/yr = population dose per year; U_3O_8 = uranium oxide (yellowcake); UF_6 = uranium hexafluoride

Table B-6. Uranium Enrichment – Centrus, Piketon, Ohio

Activity	*Document #*	*Title*	*Link*
	(NRC, 2022a)	Centrus Energy Corp. (formerly USEC Inc.), Gas Centrifuge Enrichment Facility	https://www.nrc.gov/materials/fuel-cycle-fac/usecfacility.html
	(ACO, 2020), LA-3605-0002	Proposed Changes for LA-3605-0002, Environmental Report (ER) for the American Centrifuge Plant (for the HALEU Demonstration Program)	https://www.nrc.gov/docs/ML2013/ML20139A098.pdf
	(DOE, 2011), DOE/EIS-0468	Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio (DOE adopts NUREG-1834)	https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/EIS-0468-FEIS-2011.pdf
	(NRC, 2006), NUREG-1834	Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1834/index.html
Centrus – HALEU Enrichment Demonstration (20 kg)	**Analysis of NEPA Documentation: Full Coverage** – ACO, a subsidiary of Centrus Energy Corporation, planned to install a 16-centrifuge HALEU cascade under its American Centrifuge Lead Cascade Facility license. Between December 2019 and June 2020, ACO submitted its HALEU demonstration application documents as an amendment request for its ACP license. The NRC staff completed its reviews of these submittals and on June 11, 2021, issued License Amendment 13 – Approval to Operate Sixteen Centrifuges to Demonstrate Production of High-Assay Low-Enriched Uranium. Transportation of HALEU is not covered by the existing NEPA documents. On January 5, 2022, DOE issued solicitation #89243222RNE000026 for *HALEU Demonstration Cascade Completion and HALEU Production*. The solicitation was looking for operators of the Piketon, Ohio, facility for completion of the demonstration cascade, initial cascade operation and production of 20 kg of HALEU, ongoing cascade operation and production of 900 kg of HALEU in year 1, and ongoing cascade operations for years 2 to 4, 5 to 7, and 8 to 10, at 900 kg per year.		
Centrus – HALEU Enrichment 0.9 MT/yr (9 MT)	**Analysis of NEPA Documentation: Planned** – ACO had indicated that if the NRC approved its HALEU demonstration application (described above), it would likely request the NRC to further amend the ACP license by approving continued operation of the 16-centrifuge HALEU cascade for an additional period of time beyond the contract expiration date. See the above discussion of the DOE solicitation to operate the Piketon, Ohio, facility.		
Centrus – Production Scale HALEU Enrichment (19.75%)	**Analysis of NEPA Documentation: Proposed** – ACO stated that the Piketon, Ohio, facility could be expanded in a modular fashion to match demand. The feed material for a HALEU cascade would be 4.95% LEU produced on-site by an adjacent cascade or purchased elsewhere. Roughly 75% of the SWUs needed to produce HALEU is already contained in the LEU feed material. Also, LEU feed can be produced in an NRC Category III facility up to 10% enrichment. It lowers the costs to perform this in a Category III facility and only perform the last enrichment step (10% to 19.75%) in a Category II facility. Centrus had stated that the next 12 MTU/yr capacity could be brought online within 4 years of securing the necessary funding and/or offtake commitments, and that it could bring at least 12 MTU of additional capacity online each year after that, subject to market conditions.		

Key: % = percent; ACO = American Centrifuge Operating, LLC; ACP = American Centrifuge Plant; DOE = U.S. Department of Energy; ER = Environmental Report; HALEU = high-assay low-enriched uranium; kg = kilograms; LEU = low-enriched uranium; MT = metric tons; MT/yr = metric tons per year; MTU = metric tons of uranium; MTU/yr = metric tons of uranium per year; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; SWUs = separative work units

Table B-7. Uranium Enrichment – Global Laser Enrichment (GLE) SILEX, Wilmington, North Carolina; Paducah, Kentucky

Activity	Document #	Title	Link
		SILEX Systems Limited, Global Laser Enrichment Facility	https://www.nrc.gov/materials/fuel-cycle-fac/laser.html
	(NRC, 2012b), NUREG-1938	Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina	https://www.nrc.gov/docs/ML1204/ML12047A040.pdf
GLE – Production-Scale HALEU Enrichment (19.75%)	**Analysis of NEPA Documentation: Proposed** – GLE Test Loop commissioned in Wilmington in 2009; operational for over 10 years. Operations of the Test Loop are on hold. A full-scale facility was licensed in September 2012, but at present it is not being built due to market conditions. NEPA documentation covers GLE operations in Wilmington, North Carolina. The facility would operate at 3–6 million SWU[22] capacity, deployed in 1 to 1.5 million SWU halls. The facility at Wilmington could be modified to produce HALEU.		

Key: % = percent; GE = General Electric; GLE = Global Laser Enrichment; HALEU = high-assay low-enriched uranium; MTU = metric tons of uranium; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; SWU = separative work unit

Table B-8. Uranium Enrichment – Urenco (Louisiana Energy Services), Lea County, New Mexico

Activity	Document #	Title	Link
		Urenco (Louisiana Energy Services), Uranium Enrichment	https://www.nrc.gov/info-finder/fc/urenco-enrichment-fac-nm-lc.html
	(Urenco, 2019) (Urenco, 2020)	Urenco USA Inc. announces next-step HALEU activities	https://www.urenco.com/news/usa/2019/urenco-usa-inc-announces-next-step-haleu-activities https://gain.inl.gov/HALEU_Webinar_Presentations/11-Fletcher,URENCO-28Apr2020.pdf
	(NRC, 2015)	Environmental Assessment for the Proposed Louisiana Energy Services, Urenco-USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico	https://www.nrc.gov/docs/ML1507/ML15072A016.pdf

22 A separative work unit (SWU) is a unit of measurement used in the nuclear industry, pertaining to the process of enriching uranium for use as fuel for nuclear power plants. It describes the effort needed to separate uranium (U)-235 and U-238 atoms in natural uranium to create a final product that is enriched in U-235 atoms. For 114 kilograms (kg) of natural uranium, it takes about 70 SWUs to produce 10 kg of uranium enriched to 5% U-235. It takes on the order of 100,000 SWUs of enriched uranium to fuel a typical 1,000-megawatt commercial nuclear reactor for a year (NUREG-1938).

Table B-8. Uranium Enrichment – Urenco (Louisiana Energy Services), Lea County, New Mexico

Activity	*Document #*	*Title*	*Link*
	(NRC, 2005a), NUREG-1790	Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1790/index.html
Urenco – LEU+ Enrichment 5 to < 10%	**Analysis of NEPA Documentation: Planned** – The Urenco facility currently converts U_3O_8 to UF_6 and enriches the UF_6 to < 5% LEU. The 2005 EIS (NUREG-1790) lists the maximum production capacity at 800 metric tons LEU UF_6 per year (NRC, 2005a). Urenco is currently engaging in pre-application activities with the NRC to increase their enrichment limits up to < 10% enriched uranium[23].		
Urenco – Production-Scale HALEU Enrichment (19.75%)	**Analysis of NEPA Documentation: Proposed** – Available space on existing Urenco Category III nuclear-licensed site for additional facilities. Scope for expansion to accommodate Category II facility for HALEU. Urenco estimates that if detailed design, site permits, and contractor selection were undertaken in parallel with the regulatory licensing process, they could construct, commission, and start up a HALEU production unit within 24 months of regulatory licensing approval. Subject to firm customer commitments, Urenco is pursuing the design, licensing, construction, and operation of a facility at the site in New Mexico, to produce HALEU. Although existing enrichment capacity (designed and licensed as a Category III facility) cannot be repurposed to produce HALEU, a separate, relatively small, dedicated facility can be co-located with the existing enrichment capacity at the site to produce HALEU, with the ability to use feedstock generated by the existing facility and to rely on the site's existing infrastructure. For this phase, and as further discussed below, a conceptual design of an enrichment facility is being developed for the New Mexico site that would produce UF_6 enriched up to 19.75% U-235 (Source: Urenco Response to Request for Information).		

Key: < = less than; % = percent; EIS = Environmental Impact Statement; HALEU= high-assay low-enriched uranium; LEU = low-enriched uranium; LEU+ = uranium enriched 5% up to 10%; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; U-235 = uranium-235; U_3O_8 = uranium oxide (yellowcake); UF_6 = uranium hexafluoride

Table B-9. Uranium Deconversion – International Isotopes, Hobbs, New Mexico

Activity	*Document #*	*Title*	*Link*
Depleted UF_6 Deconversion and Fluorine Extraction		International Isotopes, Depleted Uranium Deconversion	https://www.nrc.gov/info-finder/fc/iifp-lea-co-nm-lc.html
	(NRC, 2012a) NUREG–2113	Environmental Impact Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico – Final Report	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr2113/index.html

[23] LEU and HALEU at 5% to < 10% enrichment can be produced in an NRC Category III facility. HALEU at 10% to 19.75% can only be handled in a Category II facility. Therefore, HALEU enrichment between 5% and < 10% can be accomplished with less facility modifications and at less costs than HALEU at 10% to 19.75% enrichment.

Table B-9. Uranium Deconversion – International Isotopes, Hobbs, New Mexico

Activity	Document #	Title	Link
	Analysis of NEPA Documentation: Full Coverage[24] On October 2, 2012, the NRC issued a 40-year license for International Isotopes Fluorine Products, Inc., a subsidiary of International Isotopes, Inc., to construct and operate a fluorine extraction and depleted uranium deconversion (DUF_6 to DU oxide) facility near Hobbs, New Mexico. International Isotopes Fluorine Products, Inc. is licensed to possess up to 750 MT of DU. This activity is for processing of depleted UF_6 tails from uranium enrichment and would not be affected by HALEU production except that the volume of tails available to be processed may increase.		

Key: DU = depleted uranium; DUF_6 = depleted uranium hexafluoride; HALEU = high-assay low-enriched uranium; MT = metric tons; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; UF_6 = uranium hexafluoride

Table B-10. Uranium Deconversion – Portsmouth, Ohio; Paducah, Kentucky

Activity	Document #	Title	Link
Depleted UF_6 Deconversion to Oxide		Portsmouth and Paducah DUF_6 Conversion	https://www.energy.gov/em/portsmouth-paducah-depleted-uranium-hexafluoride
	(DOE, 2020) DOE/EIS-0359-S1 DOE/EIS-0360-S1	Final Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride	https://www.energy.gov/nepa/doeeis-0359-s1-and-doeeis-0360-s1-supplemental-eis-disposition-depleted-uranium-oxide
	(DOE, 2004a) DOE/EIS-0360	Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site	https://www.energy.gov/nepa/articles/eis-0360-final-environmental-impact-statement
	(DOE, 2004b) DOE/EIS-0359	Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site	https://www.energy.gov/nepa/articles/eis-0359-final-environmental-impact-statement
	Analysis of NEPA Documentation: Full Coverage[25] – In 2004, DOE issued Final EISs for construction and operation of facilities to convert DUF_6 to DU oxide at DOE's Paducah site in Kentucky (DOE/EIS-0359) and Portsmouth site in Ohio (DOE/EIS-0360) and two associated RODs to build the facilities. In 2020, DOE published in the *Federal Register* (85 FR 23022) a Final Supplemental EIS for actions for disposition of DU oxide conversion product generated at these sites and declared waste (DOE/EIS-0359-S1 and DOE/EIS-0360-S1).		

Key: DOE = U.S. Department of Energy; DU = depleted uranium; DUF_6 = depleted uranium hexafluoride; EIS = Environmental Impact Statement; NEPA = National Environmental Policy Act; ROD = Record of Decision; UF_6 = uranium hexafluoride

24 The NEPA documentation for this activity provides full coverage for activities related to HALEU production except the volume of material processed may be greater.
25 The NEPA documentation for this activity provides full coverage for activities related to HALEU production except the volume of material processed may be greater.

Table B-11. Uranium Deconversion and Fuel Fabrication – BWX Technologies, Inc. Nuclear Operations Group, Lynchburg, Virginia

Activity	***Document #***	***Title***	***Link***
BWXT – HALEU Fuel Fabrication		BWXT Nuclear Operations Group, Fuel Fabrication	https://www.nrc.gov/info-finder/fc/bwxt-nuclear-lc.html
	(DOE-ID, 2020) DOE-ID-INL-20-004 R3	DOE-ID CX Determination, TRISO Fuel Production Capability Rev 3	https://www.id.energy.gov/nepa/DOE-ID-INL-20-004%20R3.pdf
	(NRC, 2005b)	Environmental Assessment Related to the Renewal of NRC License No. SNM-42 for BWXT	https://www.nrc.gov/docs/ML0534/ML053430248.pdf
	(NRC, 1986) NUREG-1227	Environmental Assessment for renewal of Materials License No. SNM-778 Babcock and Wilcox Lynchburg Research Center	https://www.nrc.gov/docs/ML2021/ML20212C435.pdf
	Analysis of NEPA Documentation: Full Coverage – The 2020 CX provides NEPA coverage for transportation of HEU from Y-12 to BWXT and demonstration-scale TRISO fuel production at BWXT. The NRC 2005 EA provides broader NEPA coverage for TRISO fuel production.		

Key: BWXT = BWX Technologies, Inc.; CX = categorical exclusion; DOE = U.S. Department of Energy; EA = Environmental Assessment; HALEU = high-assay low-enriched uranium; HEU = highly enriched uranium; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; TRISO fuel = tri-structural isotropic fuel; Y-12 = Y-12 National Security Complex

Table B-12. HALEU Fuel Fabrication – TRISO-X, Oak Ridge, Tennessee

Activity	***Document #***	***Title***	***Link***
TRISO-X Fuel Fabrication		TRISO-X, Fuel Fabrication	https://www.nrc.gov/info-finder/fc/triso-x.html
	(TRISO-X, 2022)	TRISO-X Environmental Report	https://www.nrc.gov/docs/ML2226/ML22266A269.html
	Analysis of NEPA Documentation: Planned – License application was submitted to the NRC on April 6, 2022, with an Environmental Report submitted in September 2022. The facility is scheduled for start-up as early as 2025 and would initially produce 8 MTU/yr of TRISO fuel supporting about 16 advanced nuclear reactors, potentially expanding production to 16 MTU/yr by the early 2030s. NEPA document pending.		

Key: HALEU = high-assay low-enriched uranium; MTU/yr = metric tons of uranium per year; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; TRISO fuel = tri-structural isotropic fuel

Table B-13. Uranium Deconversion and Fuel Fabrication – Framatome, Richland, Washington

Activity	Document #	Title	Link
Framatome – HALEU Deconversion and Fuel Fabrication		Framatome, Fuel Fabrication	https://www.nrc.gov/info-finder/fc/areva-np-lc.html
	(NRC, 2009b)	Environmental Assessment for the Renewal of U.S. Nuclear Regulatory Commission License No. SNM–1227 for AREVA NP, INC. Richland Fuel Fabrication Facility	https://www.nrc.gov/docs/ML0907/ML090700258.pdf
	Analysis of NEPA Documentation: No Coverage – The existing NEPA documents cover LEU deconversion and fuel fabrication in Category III facilities. The permit limit for operations is 400 MT of uranium dioxide per year although the maximum throughput for the period 2003 through 2007 was 141 MT (NRC, 2009b). HALEU deconversion and fuel fabrication in Category II facilities would require updating the site ER, a license amendment, and additional NEPA documentation. No information is available on any plans to implement at this facility.		

Key: ER = Environmental Report; HALEU = high-assay low-enriched uranium; LEU = low-enriched uranium; MT = metric tons; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission

Table B-14. Uranium Deconversion and Fuel Fabrication – Global Nuclear Fuel, Wilmington, North Carolina

Activity	Document #	Title	Link
GNF – HALEU Deconversion and Fuel Fabrication		Global Nuclear Fuel, Fuel Fabrication	https://www.nrc.gov/info-finder/fc/global-nuc-fuels-america-fuel-fab-lc.html
	(NRC, 2009c)	Environmental Assessment for the Renewal of U.S. Nuclear Regulatory Commission License No. SNM–1097 for Global Nuclear Fuel–Americas, Wilmington Fuel Fabrication Facility	https://www.nrc.gov/docs/ML0911/ML091180239.pdf
	Analysis of NEPA Documentation: No Coverage – The existing NEPA documents cover LEU deconversion and fuel fabrication in Category III facilities. Production rates are in the 1,100 to 1,400 MT/yr range (NRC, 2009c). HALEU deconversion and fuel fabrication in Category II facilities would require updating the site ER, a license amendment, and additional NEPA documentation. No information is available on any plans to implement at this facility.		

Key: ER = Environmental Report; GNF = Global Nuclear Fuel; HALEU = high-assay low-enriched uranium; LEU = low-enriched uranium; MT/yr = metric tons per year; NEPA = National Environmental Policy Act

Table B-15. Uranium Deconversion and Fuel Fabrication – Westinghouse Electric Company, Columbia, South Carolina

Activity	Document #	Title	Link
Westinghouse – HALEU Deconversion and Fuel Fabrication		Westinghouse Electric Company, Fuel Fabrication	https://www.nrc.gov/info-finder/fc/westinghouse-fuel-fab-fac-sc-lc.html
	(NRC, 2022b) NUREG-2248	Final Environmental Impact Statement for the License Renewal of the Columbia Fuel Fabrication Facility in Richland County, South Carolina	https://www.nrc.gov/docs/ML2220/ML22201A131.pdf
	(NRC, 1985) NUREG-1118	Environmental Assessment for Renewal of Special Material License # SNM-1107	https://www.nrc.gov/docs/ML1719/ML17191A577.pdf
	Analysis of NEPA Documentation: No Coverage – The existing NEPA documents cover LEU deconversion and fuel fabrication in Category III facilities. The facility has a production capacity of 1,500 MTU/yr with a maximum capacity of 1,600 MTU/yr (NUREG-2248). HALEU deconversion and fuel fabrication in Category II facilities would require updating the site ER, a license amendment, and additional NEPA documentation. No information is available on any plans to implement at this facility.		

Key: ER = Environmental Report; HALEU = high-assay low-enriched uranium; LEU = low-enriched uranium; MTU/yr = metric tons of uranium per year; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission

Table B-16. Spent Nuclear Fuel Storage – Interim Storage Partners, Andrews, Texas

Activity	Document #	Title	Link
Interim Storage Partners – HALEU SNF Storage		Interim Storage Partners (ISP), Consolidated Interim Storage Facility for SNF	https://www.nrc.gov/waste/spent-fuel-storage/cis/waste-control-specialist.html
	(NRC, 2021c) NUREG-2239	Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas	https://www.nrc.gov/docs/ML2120/ML21209A955.pdf
	Analysis of NEPA Documentation: Full Coverage – On September 17, 2021, the NRC issued a license to ISP for its CISF in Andrews County, Texas. Materials License No. SNM2515 authorized ISP to construct and operate its facility as proposed in its license application, as amended, and to receive, possess, store, and transfer SNF, including a small quantity of mixed-oxide fuel, and GTCC LLW at the Waste Control Specialist CISF. The license authorized ISP to store up to 5,000 MTU (5,500 short tons) of SNF for a license period of 40 years.		

Key: CISF = consolidated interim storage facility; GTCC LLW = Greater-than-Class C low-level radioactive waste; HALEU = high-assay low-enriched uranium; ISF = interim storage facility; ISP = Interim Storage Partners; MT = metric tons; MTU = metric tons of uranium; NRC = U.S. Nuclear Regulatory Commission; SNF = spent nuclear fuel

Table B-17. Spent Nuclear Fuel Storage – Holtec International, Lea County, New Mexico

Activity	Document #	Title	Link
Holtec – HALEU SNF Storage		Holtec International, Consolidated Interim Storage Facility for SNF	https://www.nrc.gov/waste/spent-fuel-storage/cis/holtec-international.html
	(NRC, 2022c) NUREG-2237	Environmental Impact Statement for the Holtec International's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel and High-Level Waste	https://www.nrc.gov/docs/ML2218/ML22181B094.pdf
	Analysis of NEPA Documentation: Full Coverage – On May 9, 2023, the NRC issued a license to Holtec International (Holtec) for a CISF, in Lea County, New Mexico. Materials License No. SNM-2516 authorizes Holtec to receive, possess, store, and transfer spent fuel and associated radioactive materials at the HI-STORE CIS Facility. The NRC prepared a Final EIS as part of its environmental review of the Holtec license application to construct and operate a CISF for SNF and GTCC LLW, along with a small quantity of mixed oxide fuel. The NRC license authorized the initial phase (Phase 1) of the project to store up to 8,680 MTUs (9,568 short tons) in 500 canisters for a license period of 40 years.		

Key: CISF = consolidated interim storage facility; EIS = Environmental Impact Statement; GTCC LLW = Greater-than-Class C low-level radioactive waste; HALEU = high-assay low-enriched uranium; ISF = interim storage facility; MT = metric tons; MTU = metric tons of uranium; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; SNF = spent nuclear fuel

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APPENDIX C – FEDERAL REGISTER NOTICES

List of Figures

No figures are presented in this appendix.

List of Tables

No tables are presented in this appendix.

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Appendix C Federal Register Notices

C.1 Notice of Intent

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DEPARTMENT OF ENERGY

Notice of Intent to Prepare an Environmental Impact Statement for High-Assay Low-Enriched Uranium (HALEU) Availability Program Activities in Support of Commercial Production of HALEU Fuel

AGENCY: Office of Nuclear Energy, Department of Energy.

ACTION: Notice of intent.

SUMMARY: In the Energy Act of 2020, the Secretary of Energy is charged with establishing and carrying out, through the Office of Nuclear Energy, a program to support the availability of uranium enriched to greater than 5 and less than 20 weight percent uranium-235 (U–235) (*i.e.*, high-assay low-enriched uranium [HALEU]), for civilian domestic research, development, demonstration, and commercial use. Consistent with the objectives of, and direction in the Energy Act of 2020, the Department of Energy (DOE) proposes to take actions to establish a temporary domestic demand for HALEU to stimulate a diverse, domestic commercial HALEU supply that could ultimately lead to a competitive HALEU market and a more certain domestic HALEU demand. To this end, DOE intends to prepare an environmental impact statement (EIS) in accordance with the National Environmental Policy Act (NEPA) and its implementing regulations that will analyze the impacts of DOE's Proposed Action to facilitate the domestic commercialization of HALEU production and to acquire HALEU for ultimate commercial use or demonstration projects.

DATES: DOE invites public comment on the scope of the EIS during a 45-day public scoping period commencing on June 5, 2023, and ending on July 20, 2023. DOE will hold webcast scoping meetings on June 21, 2023, at 6:00 p.m. ET, on June 21, 2023, at 8:00 p.m. ET, and on June 21, 2023, at 10:00 p.m. ET. In defining the scope of the EIS, DOE will consider all comments received or postmarked by the end of the scoping period. Comments received or postmarked after the scoping period end date will be considered to the extent practicable.

ADDRESSES: Written comments regarding the scope of the EIS should be sent to Mr. James Lovejoy, DOE EIS Document Manager, by mail to: U.S. Department of Energy, Idaho Operations Office, 1955 Fremont Avenue, MS 1235, Idaho Falls, Idaho 83415; or by email to *HALEU-EIS@nuclear.energy.gov*.

FOR FURTHER INFORMATION CONTACT: Further information including public meeting and registration information is available on the project website, *https://www.energy.gov/ne/haleu-environmental-impact-statement*. All requests for additional information including requests to be placed on the email list for project information should be sent to *HALEU-EIS@nuclear.energy.gov*. For information regarding the HAP or the EIS, contact Mr. James Lovejoy, *lovejojb@id.doe.gov*, (208) 526–4519. For general information on DOE's NEPA process, contact Mr. Jason Anderson, *andersjl@id.doe.gov*, (208) 526–0174.

SUPPLEMENTARY INFORMATION:

Background

DOE has an overall uranium strategy that covers a variety of enriched uranium needs, including civilian and commercial needs supported by the Office of Nuclear Energy and national security, nonproliferation, and defense needs supported by the National Nuclear Security Administration's Defense Programs, Defense Nuclear Nonproliferation, and Naval Reactors programs. Section 2001(a) of the Energy Act of 2020 (42 U.S.C. 16281; 134 Stat. 2453; Pub. L. 116–260 Div Z) charges the Secretary of Energy with establishing and carrying out, through the Office of Nuclear Energy, a program to support the availability of HALEU for civilian domestic research, development, demonstration, and commercial use. HALEU (or "HA–LEU") is defined under the Energy Act of 2020 as "uranium having an assay greater than 5.0 weight percent and less than 20.0 weight percent of the uranium-235 isotope." 42 U.S.C. 16281(d)(4). DOE's activities to implement Section 2001(a), generally referred to as the HALEU Availability Program (HAP), include several elements, such as conducting biennial surveys of industry stakeholders to estimate the amount of HALEU needed for domestic commercial use for the subsequent 5 years; establishing a consortium of entities involved in the nuclear fuel cycle to support the availability of HALEU (including by providing survey information and purchasing HALEU made available by the Secretary for commercial use); and acquiring or providing HALEU from a stockpile of uranium owned by the Department or using enrichment technology to supply members of the consortium with HALEU for commercial use or demonstration projects.

The focus of this NOI and related EIS is DOE's implementation of Section 2001(a)(2)(D)(v) of the Energy Act of 2020 for the acquisition of HALEU produced by a commercial entity using enrichment technology and making it available for commercial use or demonstration projects. The Inflation Reduction Act (section 50173) [Pub. L. 117–169] provided $700 million in support of various HALEU program activities directed in the Energy Act of 2020. From these funds, $500 million is being considered for use in stimulating a diverse commercial supply chain for HALEU. The establishment of this commercial supply of enriched uranium is a key element of DOE's uranium strategy.

The current U.S. commercial power reactor fuel cycle is based on reactor fuel that is enriched to no more than 5 weight percent U–235 (low-enriched uranium [LEU]), but many advanced reactor designs require HALEU, which is enriched to greater than 5 and less than 20 weight percent U–235. Using HALEU fuel allows advanced reactor designers to create smaller reactors that produce more power with less fuel than the current fleet of reactors. HALEU will also allow developers to optimize their systems for longer life cores, increased safety margins, and other increased efficiencies. Although some advanced reactor technologies are currently under development, there is no domestic commercial source of HALEU available to fuel them. The lack of such a source could impede both the demonstration of these technologies being developed and the development of future advanced reactor technologies. Initial sources of uranium to meet the requirements of the HAP could be existing DOE stockpiles of highly enriched uranium (HEU) that would be processed or down-blended into HALEU (*e.g.*, activities conducted outside of the Proposed Action and that are covered by separate existing or pending NEPA documentation). As DOE stockpiles are depleted, production would need to be supplemented by or transition to commercially-operated facilities.

To accelerate development of a sustainable commercial HALEU supply capability, an initial public/private partnership is recommended to address the high-fidelity (high-confidence demand) HALEU market (*e.g.*, fuel for demonstration reactors) plus a percentage of the projected commercial demand for power reactors. The private sector could incrementally expand the capacity in a modular fashion to establish HALEU enrichment and supply that are sufficient to meet future needs as a sustainable market develops.

The development of a commercial HALEU fuel cycle would involve: (1) uranium ore production (*e.g.*, in situ-recovery), (2) conversion of the uranium

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ore into enrichment feed (converting the uranium ore into hexafluoride suitable for enrichment), (3) enrichment to HALEU (in particular, HALEU enriched to at least 19.75 and less than 20 weight percent U–235), (4) deconversion (conversion of the uranium hexafluoride into forms suitable for fuel fabrication), (5) transportation services for HALEU (*e.g.,* from the enrichment site to the deconversion site), and (6) storage capability. The EIS will evaluate implementation of the Proposed Action of facilitating the commercialization of HALEU production and DOE's acquisition of HALEU, including the direct and reasonably foreseeable indirect effects of that acquisition.

Certain activities related to the Proposed Action are regulated by other agencies, including, but not limited to the Nuclear Regulatory Commission (NRC) and the Department of Transportation. DOE expects that permits, license amendments, and/or licenses may be required for activities such as mining/recovery; the operation of a conversion facility; the construction and operation of enrichment facilities, a deconversion facility, and HALEU storage facilities; and HALEU transportation. DOE will coordinate with Agreement States [1] and agencies with regulatory authority, utilize existing and related analyses of other agencies, and incorporate, as appropriate, information to ensure a robust and efficient DOE NEPA analysis, as well as to streamline and inform the process at DOE and with other entities with NEPA responsibilities related to the Proposed Action.

Purpose and Need for Agency Action

One of the aspects of a clean energy future is sustainment and expanded development of safe and affordable nuclear power. One key element of that goal is the availability of fuel to power advanced reactors. DOE is committed to support the development and deployment of the HALEU fuel cycle and to acquire and provide HALEU as authorized by Congress in Section 2001 of the Energy Act of 2020.

Development of innovative technologies, including the next generation of advanced reactors, and advanced fuels, will help ensure that nuclear power continues to bolster America's energy security by providing a source of resilient, carbon-free power in the United States.

There is currently insufficient private incentive to invest in commercial HALEU production due to the current market base. There is also insufficient incentive to invest in the necessary commercial deployment of advanced reactors because the domestic fuel supply chain does not exist. The Energy Act of 2020 aims to stimulate HALEU supply to support the development, demonstration, and deployment of advanced reactors in a manner that establishes a diversity of supply and healthy market forces for the future. This concern is a consistent theme in the industry responses to DOE's *Request for Information Regarding the Establishment of a Program to Support the Availability of High-Assay Low-Enriched Uranium* (the "RFI") (86 FR 71055–71058; December 14, 2021). These responders emphasized the importance of the HALEU consortium that is called for in the Energy Act of 2020 and that DOE established on December 7, 2022 (87 FR 75048). Responders also emphasized the opportunity for DOE to be an agent for stability (both in assuring HALEU availability and market price certainty) during the initial phase of HALEU fuel production.

DOE predicts that by the mid-2020s, approximately 22 metric tons of uranium (MTU) of HALEU will be needed for initial core loadings to support DOE's reactor demonstrations and research reactors that were converted from highly enriched uranium fuel with a high-fidelity HALEU (up to 19.75 weight percent U–235 enrichment) with demand of between 8 and 12 MTU annually for the next 10 years and increasing to over 50 MTU by 2035. Additionally, the Nuclear Energy Institute (NEI) surveyed its utility members that plan to utilize HALEU to identify their estimated annual needs through 2035. This survey estimated industry requirements could be as high as 600 MTU of HALEU at between 10.9 and 19.75 weight percent enriched U–235 per year by 2035.

Both DOE and industry groups have recognized that DOE action is needed to facilitate the development of the infrastructure that would support the availability of HALEU fuel to support both near-term research and demonstration needs and to support the U.S. commercial nuclear industry. DOE and the NEI recognize that the main challenge to establishing a commercial HALEU-based reactor economy is the upfront capital investment of more than $500 million (an NEI estimate and consistent with the Inflation Reduction Act funds appropriated to DOE) required to establish the capability of producing quantities of HALEU suitable for commercial fuel fabrication facilities needed for the various types of HALEU reactors proposed.

Proposed Action

The Proposed Action is to acquire, through procurement from commercial sources, HALEU enriched to at least 19.75 and less than 20 weight percent U–235 over a ten-year period of performance, and to facilitate the establishment of commercial HALEU fuel production. The Proposed Action implements Section 2001(a)(2)(D)(v) of the Energy Act of 2020 for the acquisition of HALEU produced by a commercial entity using enrichment technology and making it available for commercial use or demonstration projects. The Proposed Action would be conducted in a manner that prioritizes social equities and the constructive engagement with disadvantaged communities.

Given the variety of HALEU applications, the initial capability is intended to be flexible and able to accommodate:

- Enrichments of U–235 to greater than 5 and less than 20 weight percent;
- Production of between 5 and 145 MTU of HALEU;
- Modular HALEU fuel cycle facility design concepts to accommodate future growth; and
- Deconversion of uranium hexafluoride to forms suitable for production of a variety of uranium fuels, to include oxides and metal.

The NEPA coverage for the Proposed Action will address a broad range of activities. The EIS will analyze reasonable alternatives and the no action alternative, and address the following activities facilitating the commercialization of HALEU fuel production and acquisition of HALEU:

- Extraction and recovery of uranium ore (from domestic and/or foreign sources);
- Conversion of the uranium ore into uranium hexafluoride;
- Enrichment (possibly in up to three steps)
  - Enrichment to LEU to no more than 5 weight percent U–235,
  - Enrichment to HALEU greater than 5 and less than 10 weight percent U–235, and
  - Enrichment to HALEU from 10 to less than 20 weight percent U–235 in an NRC Category II facility; [2]

[1] An Agreement State is a State that has entered into an agreement with the NRC that gives the State the authority to license and inspect byproduct, source, or special nuclear materials used or possessed within their borders.

[2] NRC classifies special nuclear materials (SNM) and the facilities that possess them into three categories based upon the materials' potential for use in nuclear weapons, or their "strategic significance." The NRC's physical security requirements differ by category, from least stringent

- Deconversion of the uranium hexafluoride to uranium oxide, metal, and potentially other forms in an NRC Category II facility;
- Storage in an NRC Category II facility;
- DOE acquisition of HALEU; and
- Transportation of uranium/HALEU between facilities.

In addition to the activities above, there are several reasonably foreseeable activities that could result from implementation of the Proposed Action. They include:

- Fuel fabrication for a variety of fuel types in an NRC Category II facility;
- Reactor (demonstration and test, power, isotope production) operation; and
- Spent fuel storage and disposition.

While not specifically a part of the Proposed Action, the impacts from these reasonably foreseeable activities would be acknowledged and addressed to the extent practicable.

Potential Environmental Issues for Analysis

DOE proposes to address the issues listed in this section when considering the potential impacts of the Proposed Action:

- Potential effects on public health from exposure to radionuclides under routine and credible accident scenarios, such as natural disasters (floods, hurricanes, tornadoes, and seismic events).
- Potential impacts on surface and groundwater, floodplains and wetlands, and on water use and quality.
- Potential impacts on air quality (including climate change) and noise.
- Potential impacts on plants, animals, and their habitats, including species that are Federal- or state-listed as threatened or endangered, or of special concern.
- Potential impacts on geology and soils.
- Potential impacts on cultural and historic resources.
- Socioeconomic impacts on potentially affected communities.
- Potential disproportionately high and adverse effects on minority and low-income populations.
- Potential impacts on land-use plans, policies and controls, and visual resources.
- Potential impacts on waste management practices and activities.
- Potential impacts from the transportation of HALEU-related radioactive materials.
- Potential impacts of intentional destructive acts, including sabotage and terrorism.
- Unavoidable adverse impacts and irreversible and irretrievable commitments of resources.
- Potential cumulative environmental effects of past, present, and reasonably foreseeable future actions.
- Compliance with all applicable Federal, state, and local statutes and regulations, and with international agreements, and required Federal and state environmental permits, consultations, and notifications.

Public Scoping Process

NEPA implementing regulations require an early and open process for determining the scope of an EIS and for identifying the significant issues related to a proposed action. To ensure that a full range of issues related to the Proposed Action are addressed, DOE invites Federal agencies, state, local, and tribal governments, the general public, and the commercial community to comment on the scope of the EIS. Specifically, DOE invites comment on the identification of reasonable alternatives and information and analyses relevant to the Proposed Action and specific environmental issues to be addressed. Analysis of written and oral public comments provided during the scoping period will help DOE further identify concerns and potential issues to be considered in the Draft EIS.

Virtual Scoping Meeting Information

DOE will host three interactive webcasts during the scoping period as listed under the **DATES** section. The purpose of the webcasts is two-fold: the first is to provide the public with information about the NEPA process and the Proposed Action and the second is to invite public comments on the scope of the EIS.

The webcasts will begin with presentations on the NEPA process and the Proposed Action. Following the presentations, there will be a moderated session during which members of the public can provide oral comments on the scope of the EIS. Commenters will be allowed 3 minutes to provide comments. Comments will be recorded.

DOE recommends that members of the public who would like to provide oral comments pre-register for the virtual scoping meetings. Although pre-registration is not required, pre-registered attendees will have prioritized oral comments in the limited 50-minute comment period. Those who attend as a guest will also be able to provide comments but will be added to the end of the comment queue during the meeting. In addition to prioritized comments, advanced registration will allow attendees to receive meeting reminders about their registered event(s). Upon registration, an email containing a unique link to join the meeting will be provided. All links to pre-register for the event will close at noon (ET), June 21, 2023. Parties interested in attending as a guest will not receive email reminders on their chosen event, but the links to attend as a guest will remain open until the meeting concludes. To obtain additional information, meeting links, and audio-only call-in options, please visit *https://www.energy.gov/ne/haleu-environmental-impact-statement.* Written comments will be accepted by mail and email at the addresses identified in the **ADDRESSES** section.

Projected EIS Schedule

DOE expects to announce the availability of the Draft EIS in the **Federal Register** by the end of 2023. This will initiate the public comment period on the Draft EIS during which DOE will hold public hearings. DOE will consider all comments on the Draft EIS received during the public comment period (and to the extent practicable, comments received or postmarked after the public comment period end date) in developing the Final EIS. Availability of the Final EIS is planned to be announced in the **Federal Register** in mid-2024. Publication of the Record of Decision (ROD) will follow no sooner than 30 days after publication of the Final EIS.

Signing Authority

This document of the Department of Energy was signed on May 24, 2023, by Dr. Kathryn Huff, Assistant Secretary for Nuclear Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by the Department of Energy. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned Department of Energy Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This

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for Category III facilities to most stringent for Category I facilities. NRC Category III Facility (low strategic significance), includes facilities containing uranium at enrichments of less than 10 weight percent U–235. NRC Category II Facility (moderate strategic significance), include facilities containing uranium at enrichments from 10 weight percent to less than 20 weight percent U–235. NRC Category I Facility (strategic special nuclear material), include facilities containing uranium at enrichments equal to or greater than 20 weight percent U–235.

administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on May 31, 2023.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

[FR Doc. 2023–11877 Filed 6–2–23; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

Combined Notice of Filings

Take notice that the Commission has received the following Natural Gas & Oil Pipeline Rate and Refund Report filings:

Filings Instituting Proceedings

Docket Numbers: PR23–53–000.
Applicants: Public Service Company of Colorado.
Description: § 284.123(g) Rate Filing: Gas Statement of Rates_5.1.23 to be effective 5/1/2023.
Filed Date: 5/26/23.
Accession Number: 20230526–5183.
Comment Date: 5 p.m. ET 6/16/23.
284.123(g) Protest: 5 p.m. ET 7/25/23.

Docket Numbers: PR23–54–000.
Applicants: Louisville Gas and Electric Company.
Description: § 284.123(g) Rate Filing: Revised Statement of Operating Conditions Exhibit A Statement of Rates to be effective 5/1/2023.
Filed Date: 5/30/23.
Accession Number: 20230530–5023.
Comment Date: 5 p.m. ET 6/20/23.
284.123(g) Protest: 5 p.m. ET 7/31/23.

Docket Numbers: RP23–794–000.
Applicants: Elba Express Company, L.L.C.
Description: Compliance filing: Annual Cashout True-Up 2023 to be effective N/A.
Filed Date: 5/26/23.
Accession Number: 20230526–5182.
Comment Date: 5 p.m. ET 6/7/23.

Docket Numbers: RP23–795–000.
Applicants: Colorado Interstate Gas Company, L.L.C.
Description: § 4(d) Rate Filing: CIG Qtly LUF Filing May 2023 to be effective 7/1/2023.
Filed Date: 5/30/23.
Accession Number: 20230530–5050.
Comment Date: 5 p.m. ET 6/12/23.

Docket Numbers: RP23–796–000.
Applicants: TransColorado Gas Transmission Company LLC.
Description: § 4(d) Rate Filing: TC Quarterly FL&U Update May 2023 to be effective 7/1/2023.
Filed Date: 5/30/23.
Accession Number: 20230530–5116.
Comment Date: 5 p.m. ET 6/12/23.

Any person desiring to intervene or protest in any of the above proceedings must file in accordance with Rules 211 and 214 of the Commission's Regulations (18 CFR 385.211 and 385.214) on or before 5:00 p.m. Eastern time on the specified comment date. Protests may be considered, but intervention is necessary to become a party to the proceeding.

Filings in Existing Proceedings

Docket Numbers: RP23–241–002.
Applicants: Sea Robin Pipeline Company, LLC.
Description: Compliance filing: Motion Revised & Cancelled Tariff Records RP23–241–000 to be effective 6/1/2023.
Filed Date: 5/30/23.
Accession Number: 20230530–5106.
Comment Date: 5 p.m. ET 6/12/23.

Any person desiring to protest in any the above proceedings must file in accordance with Rule 211 of the Commission's Regulations (18 CFR 385.211) on or before 5:00 p.m. Eastern time on the specified comment date.

The filings are accessible in the Commission's eLibrary system (*https://elibrary.ferc.gov/idmws/search/fercgensearch.asp*) by querying the docket number.

eFiling is encouraged. More detailed information relating to filing requirements, interventions, protests, service, and qualifying facilities filings can be found at: *http://www.ferc.gov/docs-filing/efiling/filing-req.pdf.* For other information, call (866) 208–3676 (toll free). For TTY, call (202) 502–8659.

Dated: May 30, 2023.

Debbie-Anne A. Reese,

Deputy Secretary.

[FR Doc. 2023–11886 Filed 6–2–23; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

Combined Notice of Filings #1

Take notice that the Commission received the following electric corporate filings:

Docket Numbers: EC23–90–000.
Applicants: Three Corners Solar, LLC, Three Corners Prime Tenant, LLC.
Description: Joint Application for Authorization Under Section 203 of the Federal Power Act of Three Corners Solar, LLC, et al.
Filed Date: 5/26/23.
Accession Number: 20230526–5253.
Comment Date: 5 p.m. ET 6/16/23.

Docket Numbers: EC23–91–000.
Applicants: Entergy Louisiana, LLC.
Description: Application for Authorization Under Section 203 of the Federal Power Act of Entergy Louisiana, LLC.
Filed Date: 5/26/23.
Accession Number: 20230526–5258.
Comment Date: 5 p.m. ET 6/16/23.

Take notice that the Commission received the following Complaints and Compliance filings in EL Dockets:

Docket Numbers: EL23–72–000.
Applicants: Payton Solar, LLC v. *PJM Interconnection, L.L.C.,* et al.
Description: Complaint of Payton Solar, LLC v. PJM Interconnection, L.L.C. et al.
Filed Date: 5/18/23.
Accession Number: 20230518–5229.
Comment Date: 5 p.m. ET 6/7/23.

Take notice that the Commission received the following electric rate filings:

Docket Numbers: ER22–424–002.
Applicants: Assembly Solar III, LLC.
Description: Compliance filing: Compliance Filing Under Docket ER22–424 to be effective 2/1/2022.
Filed Date: 5/30/23.
Accession Number: 20230530–5018.
Comment Date: 5 p.m. ET 6/20/23.

Docket Numbers: ER22–1136–002.
Applicants: Sac County Wind, LLC.
Description: Compliance filing: Compliance Filing Under Docket ER22–1136 to be effective 5/1/2022.
Filed Date: 5/30/23.
Accession Number: 20230530–5008.
Comment Date: 5 p.m. ET 6/20/23.

Docket Numbers: ER22–1610–003.
Applicants: Big River Solar, LLC.
Description: Compliance filing: Compliance Filing Under Docket ER22–1610 to be effective 9/1/2022.
Filed Date: 5/30/23.
Accession Number: 20230530–5007.
Comment Date: 5 p.m. ET 6/20/23.

Docket Numbers: ER22–1815–002.
Applicants: Mulligan Solar, LLC.
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Docket Numbers: ER22–2385–003.
Applicants: Panorama Wind, LLC.
Description: Compliance filing: Compliance Filing Under Docket ER22–2385 to be effective 7/16/2022.
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