BLM

U.S. Department of the Interior
Bureau of Land Management

Environmental Assessment

DOI-BLM-NV-B020-2020-0043-EA

Major Oil International, LLC.

Application for a Permit to Drill and

Right of Way Access

Eblana-9 Oil Well

File Number: N-90514 & NVN-099654

PREPARING OFFICE

U.S. Department of the Interior
Bureau of Land Management
Tonopah Field Office
Battle Mountain District, Nevada

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1 Introduction

1.1 Summary

Major Oil International, LLC (Major Oil), has leased a parcel of Federal land for oil and gas resources under the Mineral Leasing Act of 1920, as amended and supplemented, and Part 3100 of Chapter 43, Code of Federal Regulations (CFR) case file number N-090514. On January 20, 2020, BLM received a Notice of Staking from Major Oil for an oil well in Hot Creek Valley. An Application for Permit to Drill (APD), drilling plan, and surface use plan (SUPO) were filed using AFMSS on April 8, 2020. The proposed well would be situated in Section 29, Township 7 North (T7N), Range 51 East (R51E), Mount Diablo Baseline and Meridian (M.D.B.&M.), generally 18.5 miles north of Warm Springs in Hot Creek Valley, Nevada (Figure 1).

In conjunction with the APD, Major Oil filed a road Right-of-Way (ROW) application (N-99654) on April 7, 2020 with the Tonopah Field Office (TFO) to use a pre-existing traveled way on public land. The ROW provides access to the lease from U.S. Highway 6 using the Hot Creek Road.

The approval of the APD and ROW are federal actions subject to analysis under the National Environmental Policy Act (NEPA) of 1969 (Public Law [PL] 1-91-190, as amended [42 United States Code (USC) 4321 et seq.]). The BLM Tonopah Field Office determined that an environmental assessment (EA) is required to analyze the Eblana 9 Oil Well APD request. This EA analyzes the direct, indirect, and cumulative impacts of the Proposed Action in order to provide the information needed to determine if it would have significant impacts, in which case an Environmental Impact Statement (EIS) would be required.

- **Under the Proposed Action:** The exploration well would be drilled using the ROW access.
- **Under the No Action Alternative:** The exploration well would not be drilled and no surface disturbance would occur. The ROW access would not be approved.

Under any alternative, all appropriate statutes, regulations and policies (see Section 1.4) and Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (DOI and USDA 2007; commonly referred to as The Gold Book) would be applied.

1.2 Purpose and Need for Action, and Decision to be Made

The purpose of the action is to provide Major Oil with authorized use of the public land managed by the BLM to drill the Eblana 9 Oil well and develop associated infrastructure, in compliance with the Federal Land Policy and Management Act of 1976 (FLPMA) and other applicable federal and state laws. The need for the action is established by BLM's legal responsibility to respond to Major's application to drill Eblana 9 Oil well on Oil and Gas lease N-090514, on which Major has valid existing lease rights. The Authorized Officer (AO) must determine whether or not to approve the APD and authorize drilling at the proposed location.

1.3 Land Use Plan Conformance

Tonopah RMP (Tonopah Field Office), approved 1997

The Proposed Action is in conformance with the Tonopah Resource Management Plan (RMP) and Record of Decision approved on October 2, 1997.

The Fluid Minerals Objective in the Tonopah RMP (page 22) is "To provide opportunity for exploration and development of fluid minerals such as oil, gas, and geothermal resources, using appropriate stipulations to allow for the preservation and enhancement of fragile and unique resources."

The proposal is within an area that is designated as "open to fluid minerals leasing subject to standard lease terms and conditions" (Tonopah RMP, page 22).

A Standard Operating Procedure for Rights-of-Way, (Tonopah RMP, page 33) states, "Unless the land has been dedicated to a specific use or uses, public land within the Tonopah Planning Area is available for consideration for linear rights-of-way for access, and for utility transportation and distribution purposes. Such land is also available for areal rights-of-way purposes."

1.4 Relationship to Statutes, Regulations and Policy

The Proposed Action is in conformance with the NEPA of 1969 (P.L. 91-190 as amended; 42 USC §4321 et seq.); the Mineral Leasing Act of 1920 as amended and supplemented (30 USC 181 et seq.); the Federal Oil and Gas Leasing Reform Act of 1987, with regulatory authority under 43 CFR Part 3100, Onshore Oil and Gas Leasing and 43 CFR Part 3160, Onshore Oil and Gas Operations; and Title V of the FLPMA of 1976, Rights-of-Way (ROW), with regulatory authority under 43 CFR Part 2800, ROW. Purchasers of oil and gas leases are required to abide by all applicable federal, state and local laws and regulations. This includes obtaining all required permits if they develop the lease.

BLM Onshore Order #1 was established pursuant to the authority prescribed in 43 CFR 3160. It requires that approval of all proposed exploratory, development, and service wells and all required approvals of subsequent well operations and other lease operations be obtained in accordance with 43 CFR 3162.3-1, 3162.3-2, 3162.3-3, 3162.3-4 and 3162.5-1.

Pursuant to 43 CFR 3101.1-2, a lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold, subject to: stipulations attached to the lease; restrictions derived from specific, non-discretionary statutes; and such reasonable measures as may be required by the Authorized Officer (AO) to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed.

The exploration must be in conformance with all Nevada State and Federal requirements including, but not limited to, those of the BLM, State of Nevada Division of Minerals, State of Nevada Division of Environmental Protection, Nevada State Engineer, and the Federal Environmental Protection Agency.

National policy under 43 CFR 2801.2 states, "It is BLM's objective to grant rights-of-way under the regulations in this part to any qualified individual, business, or governmental entity and to direct and control the use of rights-of-way on public lands in a manner that:

- Protects the natural resources associated with public lands and adjacent lands, whether private or administered by a government entity;
- Prevents unnecessary or undue degradation to public lands;
- Promotes the use of rights-of-way in common considering engineering and technological compatibility, national security, and land use plans; and
- Coordinates, to the fullest extent possible, all BLM actions under the regulations in this part with state and local governments, interested individuals, and appropriate quasi-public entities."

The Proposed Action is in conformance with Nye County Policy Plan for Public Lands (2011, page 38) which states, "Oil and gas resources should be inventoried and development encouraged. Public lands with a high potential for oil or gas resources should not be withdrawn from exploration."

43 CFR 2801.6(a) … The regulations in this part apply to: (1) Grants for necessary transportation or other systems and facilities which are in the public interest and which require the use of public lands for the purposes identified in 43 U.S.C. 1761, and administering, amending, assigning, renewing, and terminating them;

Federal Land Policy and Management Act of 1976, as amended, section 501 [43 USC 1761] 9 (a) contains the following provision: "The Secretary, with respect to the public lands … are authorized to grant, issue, or renew rights-of-way over, upon, under, or through such lands for, … (6) roads, trails, highways, railroads, canals, tunnels, tramways, airways, livestock driveways, or other means of transportation except where such facilities are constructed and maintained in connection with commercial recreation facilities."

1.5 Environmental Justice

Executive Order (EO) 12898 - Federal Actions to Address Environmental Justice (EJ) in Minority Populations and Low-Income Populations - was issued by President William J. Clinton in 1994. Its purpose is to focus federal attention on the environmental and human health effects of federal actions on minority and low-income populations with the goal of achieving environmental protection for all communities (US Environmental Protection Agency 2018).

Evaluating the potential EJ effects of projects requires specific identification of minority populations when either: 1) a minority population exceeds 50 percent of the population of the affected area; or 2) a minority population represents a meaningfully greater increment of the affected population than of the population of some other appropriate geographic unit, as a whole. For the purposes of the analysis, ten or more percentage points above the reference population is considered to be meaningfully greater increment (59 Federal Register 32). In addition, it is necessary to evaluate whether or not any concentrated populations of American Indians are present.

The evaluation of the EJ populations for the Proposed Action shows that a low income EJ population is not present, a minority EJ population is not present, and an American Indian EJ population is present. The Proposed Action is relatively close to the Duckwater Tribe of Shoshone Indian Reservation. Even though there is an American Indian population in the study

area, it is not anticipated that there would be any disproportionate impacts on the existing EJ population(s) resulting from the project.

1.6 Scoping and Public Involvement

Major submitted a Notice of Staking (NOS) on January 21, 2020. In lieu of a site inspection, a Major Oil representative inspected points of reference, as chosen by BLM, taking photos in several directions and geo-referencing each photo for BLM resource specialists, on April 2, 2020. Photos and information were provided to BLM for internal review. The NOS was available through the Automated Fluid Minerals Support System (AFMSS) for public viewing.

Internal and external scoping: A BLM interdisciplinary team (List of Preparers) conducted internal scoping to identify potentially affected resources on (Chapter 3, Tables 1 and 2). BLM contacted United States Fish and Wildlife Service (USFWS) and the Nevada Sagebrush Ecosystem Program in March 2020. Nevada Department of Wildlife (NDOW) was first contacted in November 2019 and again in early August 2020.

Native American Coordination: TFO began coordination with the Duckwater Shoshone Tribe on February 18, 2020 by sending them information about the project including the project location. While no formal requests to visit the site were received, coordination and cooperation with tribal members is ongoing.

2 Proposed Action and No Action Alternative

2.1 Description of the Proposed Action

Major has leased a parcel of Federal land for potential oil and gas development under the Mineral Leasing Act of 1920, as amended and supplemented, and Part 3100 of Title 43, Code of Federal Regulations (CFR). BLM received a Notice of Staking from Major on January 20, 2020 and an Application to drill (APD) was submitted to the BLM on January 22, 2020. Main components of the project relevant to environmental effects are described in this chapter. Also see Environmental Protection Measures (EPM) (Appendix A) and General conditions (Appendix B).

In conjunction with the APD, Major Oil filed a road Right-of-Way (ROW) application (N-99654) on April 7, 2020 with the Tonopah Field Office (TFO) to use a pre-existing traveled way on public land. The ROW provides access to the lease from U.S. Highway 6 using the Hot Creek Road. Standard lease notices and stipulations were attached to this lease parcel at the time of the sale.

Location: The proposed well location (Project area) is situated in the NW ¼ NW ¼ of Section 29, T7N, R61E, M.D. B. & M. approximately 5.5 miles northwest of the Nevada Department of Transportation Blue Jay maintenance station and just over 6 miles southeast of Hot Creek Ranch. Access is via U.S. Highway 6 to the Rattlesnake Springs turn off to Hot Creek. This road is travelled 2.5 miles northwest to the main Hot Creek road where it bends to the west. Access continues 3 miles west just until the Moore's Station Wash where it intersects a pre-existing two-track road heading south. See Figure 1 for a location map showing the lease boundary and well location relative to the Hot Creek Road and U.S. Highway 6.

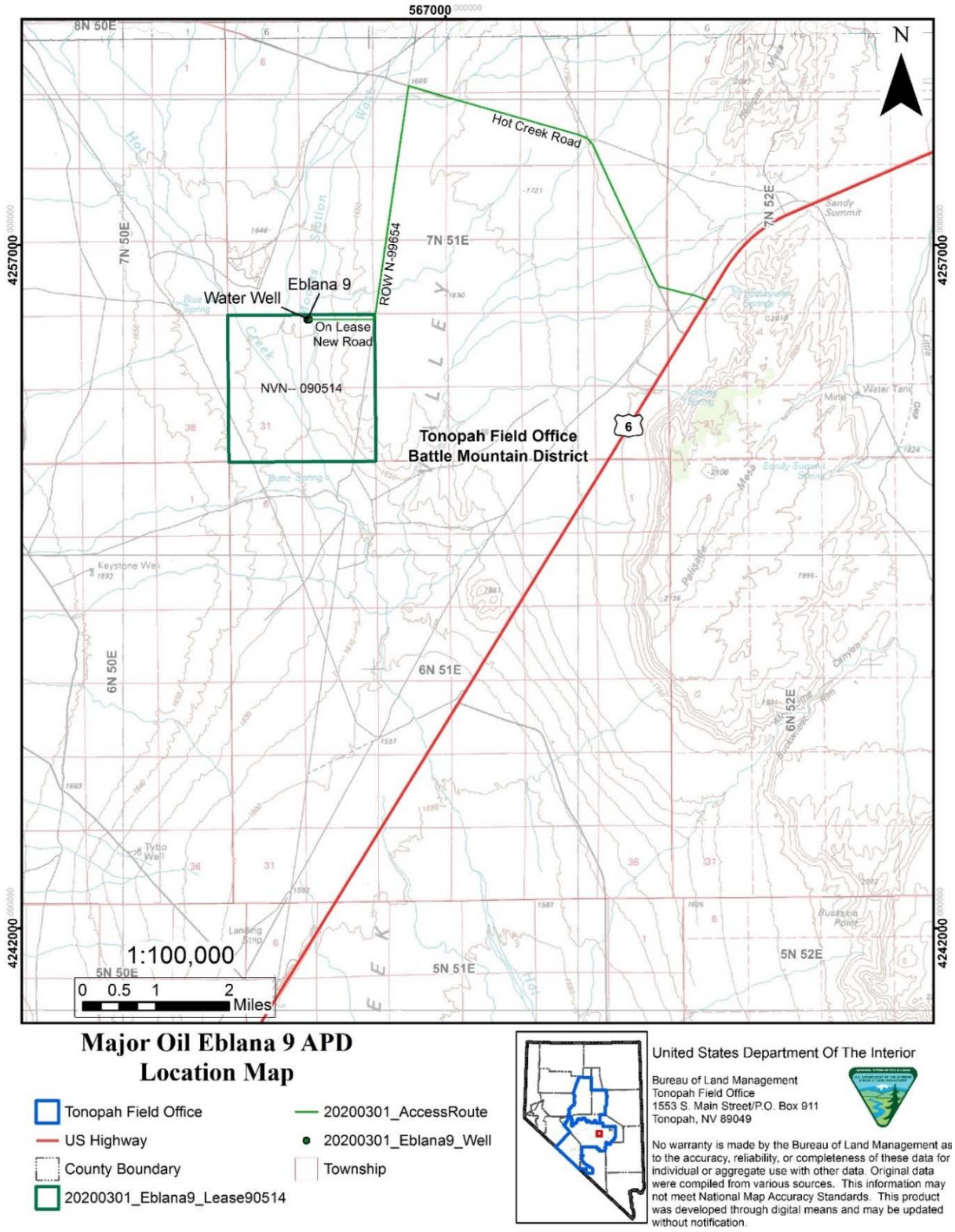


Figure 1 General location map of Major Oil's Eblana 9 Oil well APD

Access Road off-lease: The pre-existing road, (N-99654), to the south is traveled approximately 3 miles (17,041 feet) until it reaches the lease boundary. The pre-existing road requires improvements including approximately eight low elevation areas where gravel would be placed to maintain drainage and approximately six turn outs of 75 feet in length and 12 feet in width. Plans for improvement and maintenance of existing roads are to maintain good or better condition than at present. A regular maintenance plan will include monitoring, blading, surface replacement, dust abatement, spot repairs, litter cleanup, noxious weed control, and snow removal to maintain at least 12 feet for access by light duty pickup trucks, drill rig, water truck, tanker truck, and heavy equipment.

Culverts and drainage ditches would be installed only if determined necessary by the AO. The distance of roads that will be used for off lease access is 3.22 miles with a total off-lease surface disturbance of 4.81 acres (including the six turnouts).

Figure 2 General heading of the on-lease access road looking West, Hot Creek Ranch in background. Photo courtesy of Warren Graham.

Access Road on-lease: A new road will be constructed on the oil lease, heading due west from the southerly, pre-existing way using gravel hauled from a private source in Hot Creek Canyon. The road would be constructed to an approximate width of 12 feet with up to one and a half feet on either side for drainage and an additional five feet of temporary disturbance over the 4,844 feet of new road prior to reaching the well pad. To control erosion and sediment transport, the new road shall be crowned, or sloped, ditched, surfaced, drained with culverts, and/or water dips, and constructed to BLM Gold Book standards and if determined necessary by the AO (Figure 3). The total surface disturbance for the on-lease access road is expected to be approximately 1.67 acres.

Wellhead and pad: The well pad would be constructed at the end of the on-lease access road. The well pad would be constructed to be approximately 350 feet square. The well would be placed central to the pad and a mud reserve pit would be located on the northeast side of the proposed well bore. The mud pit would be constructed on the well pad to be approximately 195 feet by 80 feet, to collect cuttings from drilling. The mud pit would be fenced on three sides during drilling and fenced on the fourth side after drilling and prior to reclamation. Figure 4 illustrates the general well pad design. Total surface disturbance to construct and reclaim the well pad is approximately 2.8 acres.

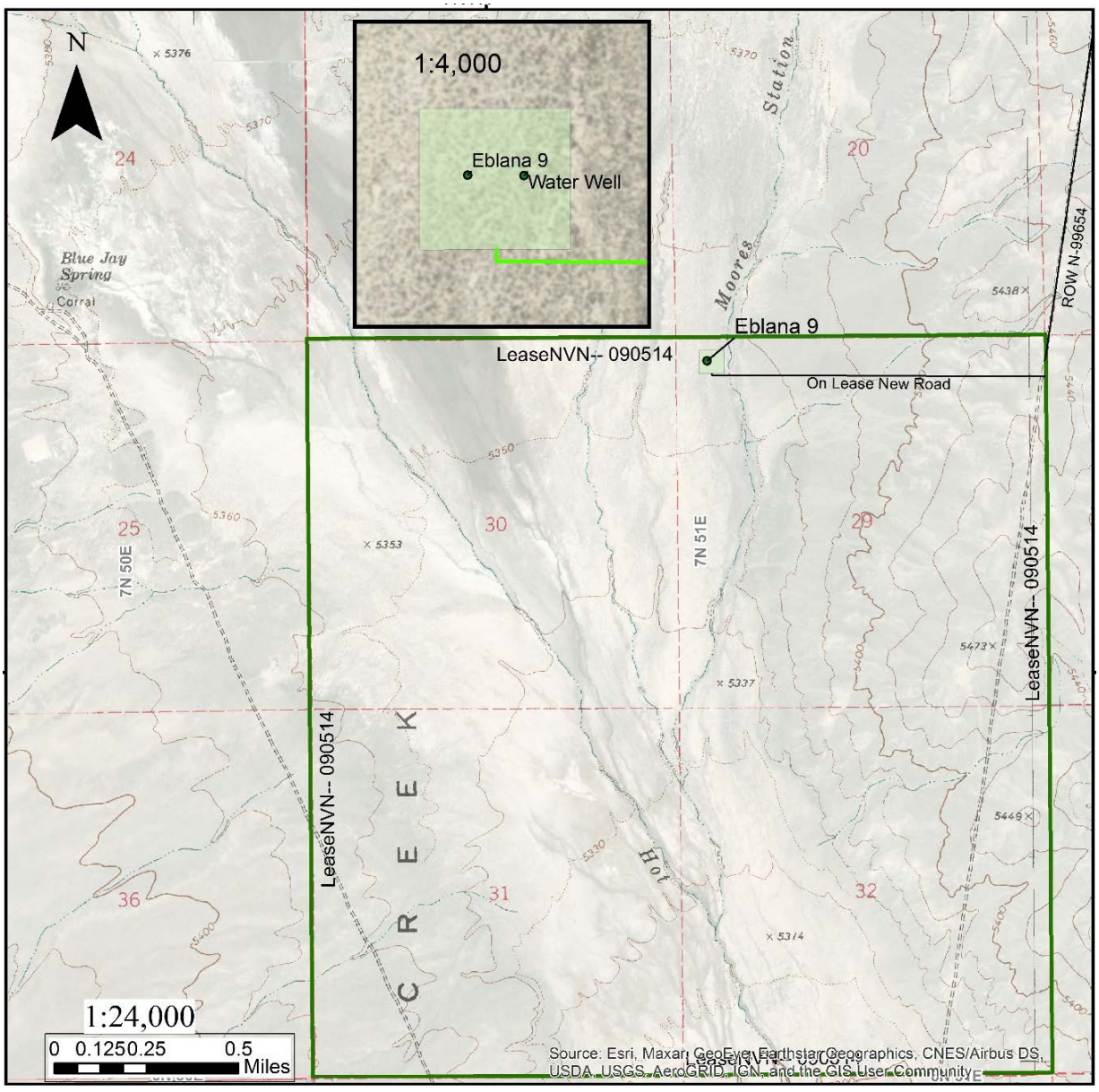


Figure 3 Major Oil's Eblana 9 Proposed oil well on-lease access road map.

Drilling: The typical drill rig and associated support equipment (rig floor and stands; draw works; mast; drill pipe; trailers; mud, fuel and water tanks; diesel generators; air compressors;

etc.) would be brought to the prepared pad on 15-20 large tractor-trailer trucks. When constructed, the drill rig would occupy approximately 2,800 square feet and the drill rig mast would be approximately 90 feet tall.

Additional equipment and supplies would be brought to the drill site during ongoing drilling and testing operations. As many as ten or more tractor-trailer truck trips could be expected on the busiest day, although on average about one large tractor-trailer truck (delivering drilling supplies and equipment), and about four small trucks/service vehicles/worker vehicles, would be driven to the site each day throughout the typical 10-day drilling period or rotation.

Difficulties encountered during the drilling process, including the need to workover or redrill the hole, could double the time necessary to successfully complete a full-size well. Drilling would be conducted 24 hours per day, 7 days per week by a crew of seven to eight workers. Occasionally, for short periods, the number of workers on site could be as high as 12.

The drilling supervisor and mud logger would remain onsite 24 hours while the well is being drilled. The drilling crew may also live "on site" during the drilling operations in a self-contained "bunkhouse" (sleeping quarters, galley, water tank and septic tank) or portable trailers which would be placed on the drill site.

The well would be drilled and cased to a design depth of 4,800 feet; total depth to be determined by the project geologist. Blowout preventer equipment, which is typically inspected and approved by the BLM, would be utilized while drilling below the surface casing. Approximately 15,000 gallons of water will be used per day during drilling operations, assuming the well is completed in 30 to 45 days. A minimum of 5,000 gallons of water and 5,000 pounds of inert, non-toxic, non-hazardous barite (barium sulfate) would likely be stored at the well site for use in preventing uncontrolled well-flow (killing the well).

The well bore would be drilled using non-toxic, temperature-stable, drilling mud composed of a bentonite clay/water or polymer/water mixture. Variable concentrations of additives would be added to the drilling mud as needed to prevent corrosion, increase mud weight, and prevent mud loss. Some of the mud additives may be hazardous substances, but they would only be used in low concentrations that would not render the drilling mud toxic. Additional drilling mud would be mixed and added to the mud system as needed to maintain drilling circulation medium.

In the event that very low pressure areas are encountered, compressed air may be added to the drilling mud, or used instead of drilling mud, to reduce the weight of the drilling fluids in the hole and assist in carrying the cuttings to the surface. The air, any drilling mud, rock cuttings, and any fluids brought to the surface would be diverted through a separator/muffler to separate and discharge the air and water vapor to the outside environment and to divert the drilling mud and cuttings to the reserve pit.

The well may need to be worked over or re-drilled if mechanical or other problems are encountered while drilling or setting casing. Additionally, reentering and re-drilling the proposed well bore, sliding the rig over a few feet on the same well pad, or drilling a new well bore through a new conductor casing may be required.

Water supply: Major proposes to use a water supply well drilled on the well pad for the sole

purpose of supply water for drilling, makeup water, and fugitive dust control during the drilling process. A temporary permit will be obtained from the Nevada Division of Water Resources (NDWR) prior to drilling.

Surface Disturbance: The maximum potential total area of surface disturbance for the access road, on-lease road, and well pad is 9.28 acres.

Production: If upon completion of drilling the well is capable of production, a completion report would be submitted to the AO. Well pumping equipment and layout would be constructed on the gravel fill of the well pad. A dike would be constructed to encompass all the production equipment, designed to contain fluids up to 110% capacity of the largest vessel. Above-ground equipment would be designed and placed to visually blend in with the surrounding landscape. Any additional facilities or disturbance beyond the disturbance area addressed in this EA would be subject to additional NEPA analysis, including hydraulic fracturing (HF).

Waste disposal: Any trash generated would be contained on-site in storage bins (i.e. dumpsters) and hauled by a commercial disposal company as needed to an approved landfill. Dumpsters and bins would be covered to discourage ravens and rodents. No trash would be buried on-site.

- A trash dumpster would be placed onsite on the proposed well pad and waste material would be hauled to a BLM-approved landfill when the dumpster is full.
- Drilling fluids and cuttings would be captured in the reserve pit and fenced according to the SOPs, Appendix B.
- Produced fluids will be captured in portable vessels on location during and following drilling and testing. Produced water is to be collected in the reserve pit during drilling and testing per Onshore Order #7.
- Portable chemical toilets will be rented and used onsite. The rental company would haul away and dispose of sewage regularly according to State and BLM requirements in EPMs.
- All oil, diesel, or hydraulic fluid spills will be cleaned up immediately, excavated and removed as required to eliminate contaminated soil. All spill-related materials would be hauled to an approved disposal site.
- All hazardous substances would be stored in appropriate containment to prevent site contamination. Current Safety Data Sheets (SDS) for all chemical substances which are used during the course of drilling, completion, reclamation, and testing operations for this project must be present at the site.

Restoration: When drilling is complete the fourth side of the reserve pit would be fenced. The pit would then be allowed to dry. Fencing would be maintained until the pit is reclaimed (see Appendix B). To reclaim the pit, fencing materials would be removed, the pit backfilled and re-contoured with the topsoil spread over the surface within one year of proper completion or abandonment of the well. If production is not achieved, the operator would place a dry hole marker; remove excess gravel; backfill, level and re-contour; scarify the well pad; and spread the stored topsoil over the surface. Reseeding will be performed per BLM recommendation in the late-Fall to early-Winter months using the broadcast seeding method. The operator would be responsible for weed control within disturbed areas, using the Noxious Weed Management Plan

(Appendix D). Successful revegetation would be expected in one to three years from the date of reseeding.

If testing shows that production is feasible, all equipment not needed for production would be removed from the site. Reclamation would follow the surface use management plan (SUPO) and the area would be reclaimed to the minimum area for production in approximately one year from the date of approval.

Construction, operation and reclamation standards and requirements: All authorized construction, operation and reclamation would be consistent with the Gold Book (DOI and USDA 2007). Conditions of Approval and Standard Operating Procedures for the Proposed Action are presented in Appendices A and B of this EA.

2.2 No Action Alternative

Under the No Action alternative, the BLM would not approve the APD and Major Oil would not have access to or an authorization to drill the proposed oil well. BLM's authority to implement the No Action alternative is limited because oil and gas lease holders possess valid existing rights to explore and potentially develop their lease subject to the stipulations of the specific lease agreement. However, BLM can deny the APD if the proposal would violate lease stipulations or applicable laws and regulations or result in undue or unnecessary environmental degradation.

2.3 Alternatives Considered but not Analyzed in Detail

No other alternatives were considered. Internal and external scoping did not provide any need or reasoning for an alternate proposal.

3 Affected Environment and Environmental Effects

3.1 Effects Assessment Methodology

This chapter presents the existing environment (i.e., the physical, biological, social, and economic values, and resources) of the impact area, the impacts to the analyzed resources, and project design features that would be carried forward into the Decision Record as conditions of approval of the proposal.

While many potential issues may arise during scoping, not all of them warrant analysis. Issues raised through scoping are analyzed if:

- Analysis of the issue is necessary to make a reasoned choice between alternatives;
- The issue is significant (e.g. an issue associated with a significant impact, such as a potential violation of a law imposed to protect the environment); and/or
- Analysis of the issue is necessary to determine if the direct or indirect impacts are themselves significant, or if it would add a measurable incremental impact to past, present and reasonably foreseeable actions that could have a cumulatively significant impact.

Potential impacts to the following resources/concerns were evaluated in accordance with criteria

listed above to determine if detailed analysis was required. Consideration of some of these items is to ensure compliance with laws, statutes or Executive Orders that impose certain requirements upon all Federal actions. Other items are relevant to the management of public lands in general, and to the BLM Tonopah Field Office in particular.

Many times a project would have some degree of effect upon a resource or concern, but that effect does not approach any threshold of significance, nor does it increase cumulative impacts by a measurable increment.

Such effects are described as “negligible” in the rationale for dismissal from analysis.

3.1.1 Definitions

The methodology used for analysis was mainly derived from oil and gas exploration drilling projects. Effects Level Definitions

- Intensity
    - Negligible: Impacts to resources, adverse or beneficial, would be barely noticeable or perceptible. Any mitigation efforts would be small, and success would be almost guaranteed.
    - Minor: Impacts to resources, adverse or beneficial, would be measurable and perceptible, but small in consequence. Impacts would be easily managed and controlled through mitigation and the probability of success would be moderate to high.
    - Moderate: Impacts to resources, adverse or beneficial, would be measurable and perceptible, but large and of consequence. Mitigation efforts would need to be implemented repeatedly and there would be slight risk of failure.
    - Major: Impacts to resources, adverse or beneficial, would be readily apparent and would substantially change the resource in the context of the Project Area. Changes would be large and/or widespread and could have permanent consequence for the resource. Mitigation to offset adverse impacts may be extensive and success is not assured.
- Duration
    - Short-term: Effects would last for the duration of the Proposed Action.
    - Long-term: Effects would last beyond the duration of the Proposed Action.
- Context
    - Localized: Effects would be limited to resources in the Project Area.
    - Regional: Effects would occur outside the Project Area.

3.1.2 Supplemental Authorities and Other Resources Considered

The NEPA Handbook Appendix 1 (BLM 2008) and the Nevada Instruction Memorandum BLM-NV-IM-2009-030 list elements of the environment that are addressed by Supplemental

Authorities, i.e. requirements that are specified by statute or Executive Order (EO) and that must be considered in BLM environmental documents. Table 1 lists these elements and provides a determination of whether each element is present in the Project Area and if it would be affected by the Proposed Action or No Action alternative. Elements that do not occur in the Project Area are not discussed further in this EA, based on the rationale provided in the table. The elimination of non-relevant issues follows Council on Environmental Quality (CEQ) policy, as stated in 40 CFR 1500.4. The potential effects of the Proposed Action and No Action Alternative are discussed under Section 3.2 through 3.10.

Table 1 Supplemental Authorities Considered in the Analysis

Supplemental Authority element	Not Present	Present / Not Affected	Present/ May be Affected	Rationale
Air Quality, GHGs, and climate change			●	See section 3.2 and 4.2.
Special Designation management: ACEC, National monument, wild and scenic rivers	●			There are no ACECs, National Monuments, or Wild and Scenic Rivers within or near the area of the Proposed Action.
Cultural Resources and Heritage Special Designations		●		A Class III inventory was conducted on 2/21/2020 for the Area of Potential Effects. No Historic Properties were identified.
Environmental Justice and Socioeconomic Values		●		Even though there is an American Indian population in the study area, it is not anticipated that there would be any disproportionate impacts on the existing EJ population(s) resulting from the project.
Farmlands, Prime or Unique	●			No prime or unique farmlands are located within the area of the Proposed Action.
Noxious Weeds and Non-Native Invasive Species			●	Noxious weeds and invasive, non-native species are known to be present along the access road. See section 3.3 and 4.3.
Native American Religious Concerns		●		The Proposed Action would not compromise the integrity of any known traditional, spiritual, cultural or ceremonial use area, nor would it limit or prevent access to any traditional or ceremonial sites that may currently be in use. Native American coordination is ongoing.

Supplemental Authority element	Not Present	Present / Not Affected	Present/ May be Affected	Rationale
Floodplains			●	See discussion in Sections 3.4 & 4.4. The proposed oil well is located within the FEMA zone A floodplain.
Threatened and Endangered Species	●			No Threatened or Endangered plants or animals or their habitats are known to exist in or near the project area.
Migratory Birds			●	See discussion under Section 3.7 & 4.7.
Wastes, Hazardous or Solid		●		The operator and any contractor would have Safety Data Sheets available for all chemicals, compounds, or substances used. All chemicals would be handled in an appropriate manner to prevent leaks or spills. The Proposed Action would comply with all applicable federal and state laws concerning hazardous materials and NTL-3A Reporting of Undesirable Events. Solid waste would be disposed offsite as approved by BLM.
Water Resources (surface and ground)			●	See discussion under 3.6 and 4.6.
Wetlands and Riparian Zones			●	See discussion under 3.6 and 4.6.
Wilderness/ Wilderness Study Areas	●			The Project Area is not in a designated Wilderness or Wilderness Study Area.
Lands with Wilderness Characteristics		●		The project access road borders an Inventory Unit with Wilderness Characteristics. LWCs are managed for multiple use.

Supplemental Authority element	Not Present	Present / Not Affected	Present/ May be Affected	Rationale
Human Health and Safety		●		Potential impacts to Human Health and Safety could occur primarily from air quality impacts (see Sections 3.2 and 4.2), surface and groundwater impacts (see Sections 3.6 and 4.6), general project construction, and hazardous and solid wastes. Major would be required to comply with all applicable Federal, State, local, and Tribal laws during project implementation as a COA. Human Health and Safety is not considered an issue for analysis and has been dismissed from detailed discussion.

Other elements of the human environment (resources) that have been considered in this environmental assessment (EA) are listed in Table 2.

Table 2 Other resources that may be affected by the proposed action

Other Resources	Not Present	Present/Not Affected	Present/May be Affected	Rationale
Grazing Management		●		The Proposed Action would affect 9.28 acres of the 155,677 acres of the Hot Creek Allotment. It would not result in a reduction of AUMs or management of the allotment. Major Oil would install appropriate temporary fencing and lighting to ensure no livestock are injured due to the Proposed Action during drilling operations. The BLM would coordinate with the livestock grazing permittee on any future proposals in the lease area to minimize impacts to the operation.
Land Use Authorizations			●	See discussion in Sections 3.9 and 4.9.
Geology and Minerals		●		There are no active, pending, or expired mining Plans of Operation, notices, or mining claims within the Project area.

Other Resources	Not Present	Present/Not Affected	Present/May be Affected	Rationale
Paleontological Resources	●			This resource is not present within the Project Area.
Recreation		●		There are no Special Recreation Management Areas (SRMA). Impacts to dispersed recreation opportunities, if any, would be temporary and negligible due to the size of the project.
Socio-Economic Values		●		The Proposed Action is unlikely to employ local residents for exploration, as drilling contractors would bring their own skilled workforce.
Soils			●	See discussion under 3.5 & 4.5.
Special Status Species			●	See discussion under Special Status Species.
Vegetation			●	See discussion under 3.5 & 4.5.
Visual Resources			●	See discussion in Section 3.9 & 4.9.
Wild Horse and Burro	●			The Hot Creek Herd Management area is located several miles to the west of the project area.
Wildlife			●	See discussion in Section 3.7. & 4.7.

3.1.3 Effects Analysis

The following sections evaluate resources for the potential for significant impacts to occur, either directly or indirectly, due to implementation of the proposed Action. Potential impacts were evaluated to determine if detailed analyses were required. Consideration of some of these items is to ensure compliance with laws, statutes, or Executive Orders that impose certain requirements upon all federal actions. Table 3.1 and Table 3.2 list and resources and rationale for not being carried forward for analysis as well as those that are carried forward.

3.2 Air Quality and Atmospheric Values

Affected Environment

Air quality

The analysis for air quality in this EA incorporates by reference the December 2019 Competitive Oil and Gas Lease Sale Environmental Assessment, DOI-BLM-NV-B000-2019-0010-EA. June 2020. The leasing EA provides in-depth analysis of air quality for development on lease parcels with discussion of the regulatory frameworks of the Clean Air Act and EPA National Ambient Air Quality Standards, parameters associated with criteria pollutants, air pollutant dispersion modeling, and particulate matter conditions. The air quality analysis provided in the EA is a

well-suited platform for incorporating by reference for the air quality analysis is this EA. Many air quality permitting and regulation activities under the CAA are delegated to the state. The Nevada Division of Environmental Protection (NDEP) Bureau of Air Pollution Control and Air Quality Planning (BAPC) is tasked with permitting and maintaining air quality data for Nevada, as well as long-term strategies for air quality improvement. The well site is located in Nye County. The County is designated as in attainment with all criteria pollutant NAAQS.

The EPA air quality index (AQI) is used for reporting daily criteria pollutant levels to the public (https://www.airnow.gov/). The AQI index is one way to evaluate how clean or polluted an area's air is and whether associated health effects might be a concern. The EPA calculates a daily AQI based on local air monitoring data. When the AQI value is between 0 and 50, air quality is categorized as "good" and criteria air pollutants pose little or no risk. Air monitoring data and daily AQIs are available near the proposed lease areas in the counties shown in Table 4. AQI data show air quality is generally good within Nye County and that there is little risk to the general public from poor air quality based on available data for the most recent 4-year period (2016-2019).

Table 3 Air Quality Index Data 2016-2019

County	Avg Days with AQI per year	Avg Days Rated Good	Avg Days Rated Moderate	Avg Days Rated unhealthy[1]	% Days Rated Good	% Days Rated Moderate	% Days Rated Unhealthy
Nye	319	306	12	2	96%	4%	<1%

[1] includes days rated Unhealthy for Sensitive Groups, Unhealthy, Very Unhealthy, and Hazardous

Source: EPA Air Data (EPA 2020) https://www.epa.gov/outdoor-air-quality-data

Air Quality Related Values (AQRVs) are resources that are sensitive to air quality and include aesthetic values such as visibility, and biological and terrestrial resources such as vegetation, soils, water, and wildlife. Air pollution can impact AQRVs through exposure to elevated atmospheric concentrations, such as O_3 effects to vegetation, impairment of scenic views by pollutant particles in the atmosphere, and deposition of air pollutants, such as sulfur and nitrogen compounds, on the earth's surface through precipitation or dry deposition. AQRVs on federal lands are identified and managed within the respective jurisdictions of several land management agencies in designated Class I areas. Class I areas are afforded specific AQRV protection under the Clean Air Act. There are no Class I areas in or adjacent to Nye County. The closest Class I area to the well site is the Hoover Wilderness, located in California, approximately 170 miles to the west.

Climate Change

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a standard period of 30 years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

Activities such as fossil fuel combustion, deforestation, and other changes in land use are

resulting in the accumulation of greenhouse gases (GHGs), such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), water vapor, and industrial gases (e.g. fluorinated gases or F-gases) in the atmosphere. Global GHG emissions are estimated by calculating CO_2 equivalent emissions using the100-year Global Warming Potential or GWP100. Worldwide estimates of total GHG emissions currently reached an all-time high of 55.3 billion metric tons in 2018 (UNEP 2019). The resulting elevated concentrations of GHGs absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth, rather than allowing the heat to escape into space under more natural conditions of background GHG concentrations.

Nye county is classified as in attainment of the National Ambient Air Quality Standards for all criteria pollutants. As shown in the December 2019 Lease Sale EA, estimated criteria pollutant and HAP emissions from drilling and developing a single well are small compared to statewide emission, and would have only negligible effects on air quality in Nye county. Since Nye county is in attainment, no conformity determination is required for this action.

Environmental Effects of the Proposed Action

Air Quality

All proposed activities associated with, or part of, exploratory drilling activities would be subject to applicable local, State, Tribal, and Federal air quality laws and regulations. Any disturbance is expected to cause increases in fugitive dust and potentially inhalable particulate matter (specifically PM_{10} and $PM_{2.5}$) in the project area and immediate vicinity. Particulate matter, or dust, may become airborne when drill rigs and other vehicles travel on dirt roads to and from the drilling location. Air quality may also be affected by exhaust emissions from engines used for drilling, transportation, electrical power generation, gas processing, compression for transport in pipelines, and other uses. These sources would contribute to potential short- and long-term increases in the following criteria pollutants: CO, O_3, NO_2, and SO_2. During the project, natural gas may occasionally be vented from the well. The gas may contain Volatile Organic Compounds (VOCs), which could also be emitted by oil in the reserve pit and tanks located at the site. The BLM encourages industry to incorporate and implement BMPs to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field operations. Measures may also be required as COAs on permits by either the BLM or the applicable state air quality regulatory agency. The BLM also manages venting and flaring of gas from federal wells as described in the provisions of Notice to Lessees (NTL) 4A, Royalty or Compensation for Oil and Gas Lost.

Climate Change

The Proposed Action would result in emissions of GHGs that contribute to the phenomenon known as global climate change. Heavy equipment, light and heavy vehicles, generators, and drill rigs would produce GHGs through combustion of fossil fuels during the exploration and production phases, should the project enter the latter phase. Venting or fugitive losses from the open reserve pits, valves and fittings, pumps, compressors, and the well heads could also occur. Any construction activity, including reclamation of the well site following the production phase, would result in GHG emissions primarily due to the combustion of fossil fuels. Should the project go into production, oil would be transported to a refinery to be processed for downstream

use, representing a source of additional GHG emissions. Average life-cycle, or "well to wheels" greenhouse gas emissions per US barrel consumed is approximately 0.18 metric ton, with 0.56 metric ton GHG emitted as result of fuel combustion (IHS CERA, Inc., 2010). The proposed well will be required to comply with all applicable requirements of federal standards for crude oil and natural gas facilities. These regulations are intended to reduce GHG and volatile organic compound emissions from affected facilities. Required control measures would also serve to reduce emissions of some HAPs.

Characteristics of the oil would determine what it is used for while the quantity of product would determine how much is available for use. It is not reasonably foreseeable what characteristic and quantity of oil would be produced because Eblana 9 is a wildcat (i.e., exploratory) well that is not guaranteed to go into production; it is speculative to assume that characteristic and quantity would closely reflect what is being produced in other oilfields, including within Railroad Valley which is just east of Hot Creek Valley. Although speculative, it is reasonable to assume that production would result in the downstream use of oil. Any burning of downstream oil products (e.g., products such as gasoline, kerosene, jet fuel, diesel oil, lubricants, waxes, asphalt, liquefied petroleum gas, and petrochemicals) would also produce emissions of GHGs that contribute to global climate change. The most recent estimate of Nevada statewide GHG emissions was 44 million tons of CO_2e in 2016. As shown in the December 2019 Lease Sale EA, estimated direct and indirect GHG emissions from drilling, developing, and producing oil from a single well would cause a negligible increase in regional, statewide, and global GHG emissions.

No Action Alternative
The No Action Alternative would create no additional impacts to air quality and atmospheric values in the analysis area outside of those occurring under current management. Activities on Federal, State and private lands adjacent to the project area would remain on going as permitted.

3.3 Noxious Weeds and Invasive Non-Native Species

Affected Environment
The BLM defines noxious weeds, invasive plants, and weeds with different, interrelated definitions (Appendix D). The BLM's policy relating to the management and coordination of these species is set forth in the BLM Manual 9015 – Integrated Weed Management. The BLM's primary focus is providing adequate capability to detect and treat smaller weed infestations before they have a chance to spread. Noxious weed control is based on a program of prevention, early detection, and rapid response.

Noxious weeds and invasive exotic plants are highly competitive and aggressive, and spread easily. They typically establish and infest disturbed sites, along roadsides and waterways. Invasive exotic and noxious plants are commonly found in Nevada in areas where there are seeps and springs or year-round water; regardless of whether a site is heavily disturbed, readily available water will increase the likelihood of all plant life including weeds. Wind, water, animals, vehicles/equipment, and humans spread invasive exotic and noxious weeds. Movement of plants from one site to anther is greatly increased by introducing humans and equipment to an area. Changes in plant community composition from native species to non-native species can change fire regimes, negatively affect habitat quality, biodiversity, and ecosystem structure and

function. While no Noxious Weeds were evident on the Project Site, invasive species halogeton (*Halogeton glomeratus*) and wild mustard (*Sinapis sp*) have been found in the general vicinity. Invasive non-native species also include animals; however, there are no records of invasive non-native animal species in or near the Project Area.

Environmental Consequences of Proposed Action
Removal of 4.47 acres of vegetation to accommodate the construction of the access road and drill pad on the lease, along with ROW access of 4.81 miles of road improvements will result in soil compaction and vegetation removal. Human movement of vehicles to, from, and around the project site could invite noxious weeds or invasive non-native species to grow in the disturbed areas and wind, water, recreation vehicles, livestock and wildlife could increase the spread of noxious and invasive exotic seeds and other plant matter, further increasing distribution of weed seeds into other locations.

The Noxious Weed Plan would reduce impacts. These would include, but not be limited to using certified weed-free seed to stabilize any topsoil stockpiles and for interim and final reclamation; and monitoring and treatment programs to detect and halt the spread of any invasive weed species. Noxious Weed impacts associated with the implementation of the Proposed Action would be minor, long-term, and localized.

No Action Alternative
Under the No Action alternative, there would be no effect associated with noxious weeds.

3.4 Floodplains

Affected Environment
The 100-year floodplain serves as the basis for floodplain management on public lands. The Federal Emergency Management Agency (FEMA) classifies areas with a one-percent chance to be flooded during a 100-year, 24-hour runoff event as Zone A or Zone AE flood hazard areas. Areas identified within Zone A or AE flood hazard areas are subject to federal regulation and mitigation.

The well pad area containing the proposed Eblana 9 well location falls in Zone A classified FEMA floodplain. During the summer months, thunderstorms develop over the Hot Creek Range to the west and could result in surface and channel runoff from Empire, Keystone, Old Dominion, Mountain View, and Hot Creek Canyon drainages. During the winter months the depth of the water table becomes very shallow. Water depth information based on well logs drilled near the project area show the water table at 20-100 feet just below surface just west of the project area. The hydrologic pattern combined with the fact that the project area lies in Zone A designation means the land surface could be flooded during a 100-year or greater storm event.

Environmental Effects of the Proposed Action
The project area lies centrally within the Hot Creek Valley ephemeral drainage. The access road uses the Moore's Creek drainage. Road surfaces could become flooded, washed out or submerged depending on the precipitation event.

Major will incorporate design features such as culverts, to route floodwaters around the well

pad or through roads, elevated structures, and anchored objects prior to flooding. Roads, drill pad, and pit areas will be designed to withstand flooding at the 100-year flood level and maintain natural surface flow directions. To prevent pooling and reduce erosion of soil, gravel will be installed at smaller channels that cross the access road to encourage drainage to lower elevation and to reduce the potential for damming. The authorized officer may require installation of culverts per EPMs (Appendix A).

In addition to the elevated road and well pad, equipment would be anchored to prevent damage or accidental spills that could occur during a flood event. Following drilling, all equipment would be removed except testing equipment. If the well produces oil, a small holding tank, electrical panel, and lighting would be installed. Electrical power, if required, might be brought to the site from nearby transmission lines, through a plan of development, requiring additional environmental analysis. If the well does not produce oil, within one year of plugging the well, all trash and debris would be removed, and the site would be reclaimed. Gravel would be removed from the channels and surfaces, culverts would be removed (if installed), the surface would be contoured to match existing surfaces, top soil would be spread out, and the site would be reseeded to encourage revegetation. Effects to floodplains are expected to be minor, short-term, and localized

Figure 4 Photo showing a low channel area road crossing where gravel will be placed.

No Action Alternative

Under the No Action Alternative, the proposed well would not be drilled and the proposed well pad would not be constructed. This alternative would create no additional effects on floodplains outside of those occurring under current management. Activities on federal, state and private lands adjacent to the project area would remain on going as permitted.

3.5 Soils, Vegetation, and Special Status Plant Species

Affected Environment

The well pad and access road lies within the saline bottom vegetative zone. Saline bottom communities occur in areas of lakeplains, alluvial flats, and marginally near stream floodplains. Slopes are zero to four percent. Soils are deep to very deep and calcareous, with high salt content decreasing with depth. The soil is mostly poorly drained with a seasonal high water table. Average annual precipitation ranges from five to eight inches.

Saline bottom communities are dominated by basin wildrye (*Leymus cinereus*), a cool-season perennial grass and alkali sacaton (*Sporobolus airoides*), a warm season perennial grass, and black greasewood (*Sarcobatus vermiculatus*) and shadscale (*Atriplex confertifolia*) shrubs. Non-native or introduced species observed were halogeton (*Halogeton glomeratus*).

The off-lease access road lies within the sandy loam vegetative zone, which typically receives five to eight inches of precipitation per year. Sandy loam soils occur in fans or piedmont slopes, or stream terraces of basin floors. Soils are typically moderately deep and well drained. Water infiltration is moderate to high.

Sandy loam plant communities are made up of Indian ricegrass (*Achnatherum hymenoides),* James' galleta (*Pleuraphis jamesii*), and squirreltail (*Elymus elymoides*), globemallow (*Sphaeralcea),* and fourwing saltbush (Atriplex canescens), winterfat (*Krascheninnikovia lanata*) and spiny hopsage (*Grayia spinosa*).

The Nevada Natural Heritage Program reported the following special status plant species that have the potential to occur in the general area include Calloway milkvetch (*Astragalus callithrix*) and Clarke phacelia (*Phacelia filiae*). No known occurrences of special status plant species have been reported within the access road or well pad. No special status plant species were observed in field visits by BLM staff.

Special status plant species range that can occur in the general area include Squalid milkvetch (*Astragalus serenoi* var. *sordescens),* Watson goldenbush (*Ericameria watsonii),* and Clarke

Environmental Effects of the Proposed Action

Both the proposed well pad and access road are located on soils derived from lacustrine or alluvium parent materials. These soils are strongly saline and as rewetting occurs, e.g. summer precipitation, soils are diluted of salt and sodium content, decreasing their salinity and alkalinity; however, as the water table elevation increases from winter precipitation, salt and sodium is replenished to the soil; thus, seed viability, germination, and water holding capacity is reduced due to high salinity. Since the soils are poorly drained, runoff is slow to very slow with ponding in some areas. Potential for soil erosion is slight.

The off-lease access road soils are coarser with greater sand and gravel content, underlain at shallow depths by a layer restrictive to root development. Disturbing these soils can result in higher rates of runoff. Major proposes to install coarse gravel in the channel crossings to maintain fluid flow during precipitation events. Proposed maintenance of the access road includes blading, which increases the opportunity for runoff and dislodging roots of vegetation.

Figure 5 Photo showing vegetation and soils in the Project Area, view is North.

The Proposed Action has the potential to directly and indirectly effects both soil types mentioned above through increased water and wind erosion potential, removal of vegetation, and compaction of soils in and around the well pad and road access.

The construction of one well pad and a reserve pit using gravel laid down on erodible soils would limit the amount of erosion during exploration. In the case that production is not achieved, the gravel would be removed, the project area would undergo restoration using stockpiled topsoil and the site would be re-contoured; this action will minimize the effect of water and wind erosion. The on-lease Project area will result in the removal of 4.47 acres of vegetation to accommodate the construction of the access road and drill pad. ROW access will result in 3.22 miles of road improvements that will result in compaction of soil and vegetation. Although topsoil will be stockpiled, soil compaction increases runoff potential and decreases the likelihood of native vegetation regrowth. Final restoration of the well pad and access road using the methods described in Section 2.1 will result in regrowth of new plant material. Soil and vegetation loss due to surface disturbance and implementation of the Proposed Action would be minor, long-term, and localized.

No Action Alternative
Under the No Action alternative, there would be no effects to soil or vegetation.

3.6 Water (Surface and Ground)

Affected Environment
The Project area is part of the Basin and Range Physiographic Province, a semiarid and arid desert environment with most precipitation originating as snow or occasional monsoon rainfall. Daily weather station data collected at the Blue Jay climate station from 1963 to 1984, approximately 5 miles southeast of the Project area, indicates the average annual precipitation is

7.58 inches (WRCC 2020a), in comparison, the Twin Springs (Fallini) climate station, located 17 miles southeast of the Project area, recorded precipitation from 1984 to 2005 at 5.49 inches (WRCC 2020a). Blue Jay records of snowfall occurred from October through April. The highest temperatures (average 93.8°F) are reached in July and the lowest temperatures (average 12.9°F) are reached in January.

Water is a fundamental component of ecosystem health, especially in arid regions where state appropriative water rights, springs, seeps, wetlands, and perennial streams are essential to biodiversity and play an important role in wildlife habitat and in the food chain for many wildlife taxa. The water quality of surface water supports a variety of uses. The surface water quality standards of Nevada support Federal laws such as the Clean Water Act of 1977, the Water Resources Planning Act of 1962, the Pollution Prevention Act of 1990 and the Safe Drinking Water Act of 1977 and are administered by the Nevada Division of Water Quality (NDWQ). Additional information may be found at the NDWR website (http://water.nv.gov/).

Nevada's groundwater quality standards are based on the assumption that groundwater should be maintained suitable for use as a drinking water source, unless the natural water quality prevents this. The State adopts the Federal primary and secondary drinking water standards (maximum contaminant limits) for groundwater resources. The chemical character and quality of groundwater varies in Railroad Valley depends largely on the mineral content of the rock, residence time, evapotranspiration and temperature.

State Appropriative Water Rights

State appropriative water rights, surface waters, and groundwater in the lease area is owned by the people of Nevada; however, the right to use surface water and groundwater and management of water appropriations are administered by and issued by the State Engineer at the Nevada Division of Water Resources (NDWR). Any entity can apply and secure appropriative water rights from the NDWR, including the BLM.

Groundwater

The Project is located in the central part of the Hot Creek hydrographic basin, designated as basin number 156 by the Nevada Division of Water Resources (NDWR). The basin is approximately 1,036 square miles (mi2) with an estimated perennial yield of 5,500 acre-feet (AF). Groundwater water right uses in Hot Creek Valley are 47 % of the perennial yield amount. The NDWR underground active summary shows the majority of groundwater is used for irrigation, stockwater, domestic, and quasi-municipal purposes. Hot Creek Valley surface water drainage is connected to Railroad Valley through the Twin Springs slough.

Surface water runoff from upland areas of the Project infiltrates pediment deposits and transitions into the basin. Water that infiltrates is either directed toward the lowest elevation or is lost to the atmosphere and vegetation as evapotranspiration, or seeps into deeper aquifers that compose larger regional flow systems. Groundwater often exists in valley alluvial fills at depth and, to a lesser extent, bedrock units where porosity of the bedrock favors recharge or a hydraulic connection with other aquifers. Perennial base flow from springs is largely driven by snowmelt runoff recharge.

Surface water, riparian, and wetland zones

Moore's Station Creek flows from north to south through the Hot Creek Valley. The access road parallels the main drainage and the lease parcel is bisected by Moore's Station and Hot Creek outflows. The Project Area is located just west of the culmination of these two drainages. In addition to the ephemeral drainages, Blue Jay Spring is located just over one mile west and Butte Spring is located over two miles south of the Project area. Based on aerial photos, the natural course of the stream channels may be directed (forced) onto the lease parcel by access roads used for other purposes.

Aerial images suggest riparian areas exist to the west and northwest of the lease area. Riparian areas develop near springs, artesian wells, and areas of surface water pooling with conditions favorable to vegetation, habitats, or ecosystems that are associated with the water body. Blue Jay Spring has a small area of vegetation and Hot Creek appears to be dammed to maximize surface vegetation to the north of the Project. There is no riparian vegetation at the Project Area.

The health of riparian and wetland ecosystems is a function of water quality and supply. Riparian and wetland areas are the most productive and important ecosystems in the District. While they represent less than one percent of the area, they contain the majority of the biodiversity and perform vital ecologic functions. Research has shown that riparian and wetland habitat characteristically has a greater diversity of plant and animal species than adjoining areas. According to the National Hydrography Dataset and the National Wetlands Inventory, this project does not fall into or intersect wetland or riparian zones.

Environmental Effects of the Proposed Action

The Proposed action may result in long and short-term alterations to the hydrologic regime depending upon the location and intensity. Clearing, grading, and soil stockpiling could alter short-term overland flow and natural groundwater recharge patterns. Building the access road, adding material to elevate the road and well pad, will potentially dam and impound floodwaters. In most cases, these potential impacts can be mitigated by better location siting and engineering controls, such as the installation of culverts.

The USEPA (2016) identifies six activities that are most likely to cause potential impacts to waters in some circumstances from hydraulic fracking to develop oil and gas production when adequate management controls are not adequate. These are: 1) Water withdrawals impacting groundwater resources; 2) Spills of hydraulic fracturing fluids or chemicals or produced water with chemicals that reach groundwater resources; 3) Wells lacking mechanical integrity allowing gases or liquids to migrate into groundwater; 4) Injection of hydraulic fracking fluids into groundwater; 5) Inadequately treated hydraulic fracturing waste water into surface water resources; and 6) Infiltration of hydraulic fracturing wastewater into groundwater from unlined pits.

Groundwater

The State of Nevada Division of Water Resources (NDWR) allocates and regulates groundwater. Groundwater requirements for drilling and construction activities associated with the Project (building the access road, constructing the drill pad, fugitive dust control and drilling operations) will consume approximately 2.5 acre-feet (802,200 gallons) of water. The

water will be supplied by the temporary water well proposed to be drilled at the drill site from the NDWR Hot Creek – 156 Hydrographic Area (HA). Groundwater appropriations for the Hot Creek 156 HA are at only 47.1% of the basin's predicted perennial yield. The quantity of water needed for the project relative to the perennial yield is very small. The water table should recover quickly from the withdrawal. After this water allocation has been used, the wells are required to be permanently sealed and cannot be used for any future purpose. This volume of water is small relative to the volume of the Hot Creek Valley aquifer, so the limited water use of the project would not be expected to impact aquifer capacity to supply springs and surface waters in the broader valley.

Water for future production purposes require water rights that need to be obtained from the State Engineer at NDWR. Sole discretion to approve or deny these water right claims lies with the SE based on prior appropriations and the capacity of the valley aquifers to supply the requisite water supply volumes. The water supply well would be drilled and plugged in accordance with Nevada Revised Statutes (NRS) 534 and Nevada Administrative Code (NAC) 534.360 and NAC 534.420. Impacts to groundwater resources would be considered minor short-term, and localized.

Oil and gas wells are cased and cemented at a depth below all usable water zones; consequently, impacts to water quality at springs are not expected. Additional specific Conditions of Approvals would be utilized to reduce the risks to groundwater. In routine operations, without failed equipment or spills, there will be no impact to water quality. Impacts to groundwater resources could occur due to failure of well integrity, failed cement, surface spills, and/or the loss of drilling, completion and petroleum products into groundwater. This would be mitigated by following BLM Onshore Orders and 43 CFR 3100 regulations requiring protection of groundwater and other mineral resources. Types of chemical additives used in well drilling and enhancement activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives that are operator and location specific. Concentrations of these additives also vary considerably and are not known prior to beginning drilling since different mixtures can be used for different formations in oil & gas exploration.

Known oil and gas production zones in Nevada are generally below 2,500 feet and do not contain freshwater. The proposed wells are approximately 10,000 feet in depth, and all shallow groundwater and usable drinking water (local aquifers are less than 1,000 ft. deep) would be isolated by both steel casing and cement. Wells are drilled in stages, with multiple strings of casing and cement to isolate shallow formations from deeper. Loss of drilling fluids (non-toxic freshwater mud) may occur during the drilling process due to changes in porosity or other properties of the rock being drilled through. To prevent loss of circulation, additional non-toxic materials such as bentonite clay, cellulose, or straw may be added to the mud to increase viscosity. None of the produced water from this lease is likely to be injected in wells for disposal since there are no injection wells at present. If the well is successful and a field is developed, produced water would be reinjected into the oil-bearing formation in order to maintain reservoir pressure. Any future injection wells would comply with Nevada UIC program rules.

Surface water, wetland, and riparian resources

Clearing, grading, and soil stockpiling activities associated with exploration and development

actions could alter short-term overland flow and natural groundwater recharge patterns. Runoff associated with storm events could increase sediment/salt loads in surface waters down gradient of the disturbed areas. Surface erosion may be greatest during the construction and would be controlled through integrated measures, BMPs, and appropriate mitigation measures such as the installation of rock rip-rap, straw bales, and wattles as necessary to prevent offsite erosion, in addition the pad would be constructed to divert any fluids into the pit for containment.

The project is located as close as ½-1 mile of spring water and wetland vegetation. Building the access road and well pad will not result in damage to the surface water or vegetation but could result in damming of Moore's Station Creek during flood events. Potential impacts to down-gradient surface water quality from spilled petroleum products would be minimized by the implementation of the Spill Prevention and Maintenance measures outlined in Appendix E. Placement of dips in road base or culverts can help maintain natural surface water runoff flow patterns and avoid damming. The potential impacts to down-gradient surface water quality from sedimentation would be minimized by the implementation of the BMPs outlined in the Gold Book (DOI and USDA 2007). Impacts to surface water, wetland, and riparian resources would be considered negligible, long-term, and localized.

No Action Alternative
Under the No Action alternative, there would be no effects to water, wetlands or riparian resources.

3.7 Wildlife, Migratory Birds, Special Status Animal Species

Affected Environment
Several wildlife species are likely to occupy the Project area. The Project is located near water sources and vegetation, which would attract animals. Wildlife habitat type is primarily saline bottom vegetation.

During exploration, there would be an increase of vehicular traffic and noise from drilling activities for approximately four weeks. This increase in anthropogenic disturbances would cause an increase of wildlife movement, requiring them to expend more energy which could potentially reduce reproduction and survivorship. Wildlife, particularly big game, are known to avoid suitable habitat adjacent to oil and gas exploration activities. Additionally, wildlife may be killed by vehicles and other drilling equipment, especially slower moving species; however, vehicles would be required to travel at reduced speeds of 25 miles per hour which would help reduce these mortalities. Noise produced from drilling would be reduced with the implementation of noise reduction measures that are incorporated into the Proposed Action.

This section addresses wildlife species and habitats that are potentially found in the project area, and for which federal law or BLM policy and guidance directs management actions, and includes preliminary scoping input from NDOW for this EA. This section discusses wildlife, migratory birds, eagles, BLM Sensitive wildlife species in the project area. See Appendix C for an explanation and current list of Nevada BLM Sensitive species in the District. Additionally, this EA considers small mammals, and reptiles.

Wildlife

Wildlife species expected in the Project Area are common throughout the Great Basin region, including: coyote (*Canis latrans*); desert cottontail (*Sylvilagus audubonii*); white-tailed antelope ground squirrel (*Ammospermophilus leucurus*); badger (*Taxidea taxus*); and kit fox (*Vulpes macrotis*). Although these species may be observed, potential habitat is present for other wildlife species as well. According to a GIS analysis using Nevada Department of Wildlife (NDOW) and the Tonopah RMP data, the lease and surrounding area provides year-round habitat for Pronghorn antelope (*Antilocapra americana*). Pronghorn antelope are widely distributed across the Project area; fawning can occur anywhere within their distribution depending on yearly habitat conditions, including playas when forage, water or cover is available. Pronghorn track and scat was observed during field visits by BLM staff.

The Project area does not coincide with mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), or bighorn sheep (*Ovis canadensis nelson*) critical or year-round habitats.

Special Status Species

Special status species that occur or may be affected by the Proposed Action are listed in Appendix C. Some of the more common special status species that could be observed in the project area include Golden eagle, Ferruginous hawk, Peregrine falcon, Sage thrasher, Brewer's sparrow, Desert pocket mouse, Desert kangaroo rat, Pale kangaroo mouse, Dark kangaroo mouse, Sagebrush vole, Long-nosed leopard lizard, Great Basin collared lizard, and Desert horned lizard. Several Long-nosed leopard lizards and Great Basin collard lizards were observed during field visits by BLM staff.

Inside the Hot Creek Valley, the project is located just outside and north of the Railroad Valley Tui Chub (*Siphateles bicolor* ssp.) range, a state protected and sensitive species and just outside and south of the Railroad Valley Springfish (*Crenichthys nevadae*) range, a state protected species classified as threatened and endangered. The recently named species of Western Toad, the Hot Creek Toad (*Anaxyrus monfontanus*), inhabits the Hot Creek watershed north of the project, its but presence at Blue Jay Spring is unknown (NDOW 2020).

No special status or federally threatened or endangered species or sign were observed during the site visit; however, habitat exists for various special status species.

Greater sage grouse

The Project area is equally distant from Greater sage grouse habitat located near Hot Creek Canyon to the west and Palisade/Halligan Mesa to the east. This habitat is designated Other habitat under the Greater sage-grouse Approved Resource Management Plan Amendment (ARMPA), BLM 2015. The ARMPA includes management decisions and best management practices to minimize the loss of or enhance greater sage grouse habitat through the Sagebrush Ecosystem Technical Team (SETT) Conservation Credit System (CCS). The nearest known lek is located approximately 15 miles North of the proposed well pad.

Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-712), which is administered by the USFWS, is the basis of migratory bird conservation and protection in the United States. It

implements four treaties that provide for international protection of migratory birds. In 1972, an amendment to the MBTA resulted in bald eagles and other birds of prey being included in the definition of a migratory bird. Under the authority of the Bald and Golden Eagle Protection Act of 1940 (as amended) (BGEPA) (16 USC 668-668d), bald eagles and golden eagles are provided additional legal protection. The BGEPA makes it unlawful to import, export, sell, purchase, barter, or take any eagle, their parts, products, nests, or eggs.

Under the MBTA, nests with eggs or the young of migratory birds may not be harmed, nor may any migratory birds be killed. Measures to prevent bird mortality and potential disturbance of breeding birds or their nests and young must be incorporated into the design of a given project. To comply with the MBTA, BLM requires that any land clearing or other surface disturbance associated with proposed actions be conducted outside the avian breeding season, which for most songbirds is March 1 – July 31. If land clearing must be conducted during the avian breeding season, a qualified biologist would survey the area prior to land clearing activities. If nests are located, or if other evidence of nesting (i.e., mated pairs, territorial defense, carrying nesting material, transporting of food) is observed, a protective buffer (the size depending on the habitat requirements of the species) should be delineated and the entire area avoided until young fledge or the nest is no longer occupied. If land clearing is not started within 14 days of the survey, then another survey would be needed. Activities may continue within the surveyed area so long as there are no periods longer than 14 days without any activity. Guidance for raptors and eagles differs from migratory songbirds in that the nesting season is extended (January 1 – August 31). No known eagle nests occur within 2 miles of the proposed well pad.

A wide variety of bird species protected by the MBTA are potentially found near the proposed well pad. These include raptors (i.e., hawks, eagles and owls) and many songbirds including, but not limited to: Sage Sparrow, Sage Thrasher, Brewer’s Sparrow, and Loggerhead Shrike.

Several species listed by U.S. Fish and Wildlife Service (USFWS) as Birds of Conservation Concern (BCC) for Great Basin Region 9 have the potential to occur within or near the Project Area, based on their known distribution and habitat associations: Bald Eagle, Golden Eagle, Greater sage-grouse, Ferruginous hawk, Peregrine Falcon, Loggerhead Shrike, Sage Thrasher, Brewer’s Sparrow, and Sage Sparrow.

Environmental Effects of the Proposed Action

If Major goes into production, additional facilities would be needed such as pumping equipment, a separation system, pipelines (within the lease area), storage facilities, water treatment and injection facilities, and compressor stations. There would be continual vehicular traffic and noise because oil would need to be trucked off site. This disturbance would continue until a Plan of Development is submitted and further NEPA analysis for additional facilities such as pipelines or transmission lines. There could be an increase of vehicular mortality. Increased vehicular traffic from production would also increase movement and displacement of wildlife, resulting in avoidance of adjacent suitable habitat and an expenditure of energy potentially reducing reproduction and survivorship.

Wildlife

Direct impacts to wildlife species with suitable habitat in the Project Area may consist of habitat loss, disturbance, mortality, and displacement from human activity and noise. Mortality

to wildlife such as small mammals and reptiles may occur from surface disturbing activities. Larger mobile animals would avoid and move away from the project-associated noise and activities; however increased vehicle traffic on roads and highways leading to the project area could cause some wildlife mortalities, to wildlife that may reside in or around the project area. Collisions with wildlife would be minimized in the project area by the required speeds of travel (25 miles per hour) during project activities.

Fluids produced during drilling would be directed to a sump built with an incline on one end so entrapped animals could exit the sump and would be adequately fenced on three sides to preclude access. The proposed well would include blow-out preventers that are designed to prevent the release of hydrocarbon-contaminated fluids to the environment. During production, if the well is successful, oil and produced fluids would be directed to tanks set within a bermed area; therefore, there would be minimal potential for wildlife to encounter any hazardous materials during drilling or operations. Direct impacts to wildlife are expected to be negligible, long term, and localized.

The well pad and on-lease access road would result in removal of 4.5 acres of vegetation and habitat loss due to land clearing and surface disturbing activities. The off-lease access road improvements could further reduce access to 4.81 acres of vegetation on an intermittent basis. The Project Area would be reclaimed and revegetated, returning the 4.81 acres of off-lease access road habitat immediately, and 4.5 acres of on-lease habitat over a longer period of time to wildlife use. Noxious weeds or non-native species of plants could reduce the quality of habitat for wildlife by reducing native plants from returning to the Project area. The protection measures in Appendix A would help reduce impacts from noxious weeds, invasive and non-native species to wildlife habitat.

Noise from construction activities would disturb wildlife initially, but impacts would be temporary, causing the animals to disperse and then return to the area Artificial lighting from the drilling rig and equipment can potentially impact wildlife such as insectivorous bats and insects.

The removal of approximately 4.47 acres of wildlife habitat and intermittent loss of 4.81 acres would result in a minimal impact to local wildlife populations as the habitat disturbed by project activities would ultimately be reclaimed and would eventually support wildlife in the same manner it does today. Indirect impacts to wildlife are minor, long term and localized.

Special Status Species

The Proposed Action has the potential to cause mortality, disturbance, and displacement to individual animals; and to affect their habitat until post-project restoration is complete. Exploration activities, including the construction of the road and well pad, could have direct impacts to special status species consisting of temporary habitat loss and disturbance from human activity and noise. Animal foraging activities within the Project area near the off-lease access road could continue since the road would be used intermittently and the construction of the well pad and on-lease access road would likely disrupt foraging over the 4.5 acres of surface disturbance. Noxious weeds, invasive, or non-native species of plants could further reduce the quality of habitat for wildlife. Project-related activities increase the potential for the spread of these species further reducing the quality of wildlife habitat in the Project Area. The protection

measures in Appendix A would help reduce impacts to wildlife.

During drilling, the sump associated with the site would be built with an incline on one end so entrapped animals could exit the sump and would be adequately fenced on three sides to preclude access. Following drilling the fourth side of the sump would be fenced while the drill cuttings solidify and dry out. If the exploration project does not result in producible oil, the Project would be reclaimed including removal of the fencing and covering the sump, regrading disturbed areas to their approximate original contour and reseeding the area with a BLM approved seed mix.

Localized, minor, long-term impacts to special status wildlife species habitat are likely to occur within the Project Area since reclamation would be designed to return disturbed lands to a level of productivity comparable to pre-exploration levels. No population-level effects are anticipated for any special status species, including migratory birds, eagles, and other BLM Sensitive species.

If the exploration project evolves to production, the Project could shrink slightly, stay the same size, or possibly expand in size depending on the resource. If the resource is small, the well pad would likely be isolated but would include a pump head, tank, piping, and power source. Trucks would visit the site several times per week. Turnouts and unused portions of the well pad would be restored to former use according to the surface use plan. If the exploration project determines a larger resource is present, additional NEPA analysis would be conducted for additional surface disturbance, such as transmission lines, new roads, pipelines, and other well sites. Once production activities have been terminated, reclamation would involve regrading disturbed areas related to the Project as explained above.

Future proposals for transmission lines would require minimum protection measures to raptors. Future well sites, pipelines, and roads would also require additional environmental analysis, including biological clearance surveys and possibly mitigation if Special Status Species are present.

Greater sage grouse

Greater sage-grouse (GRSG) habitat mapping by the SETT uses 2016 United States Geological Survey habitat maps. These show the Proposed Action is within one km of Other GRSG habitat. Oil and gas exploration under five acres is not analyzed using the Habitat Quantification Tool (HQT) or mitigated for using the Conservation Credit System (CCS) as outlined in Nevada State Regulation, Legislative Council Bureau File No. R024-19. However, if oil and gas exploration under five acres (or greater) goes into production, the Proposed Action would require compensatory mitigation using the CCS. If cumulative exploration activities from the Proposed Action and any subsequent exploration (even if included in separate NEPA) exceed five acres, compensatory mitigation would also be required using the CCS if situated within mapped sage-grouse habitat as analyzed by the HQT..

The Proposed Action was analyzed using the HQT based on the provided proposed project area. The indirect impacts from the project resulted in 56 term debits. If the Proposed Action were to go into production, the CCS requires at least one-third (1/3) of the mitigation obligation (debits) to be acquired up front before any ground disturbance; the remaining two-thirds (2/3) of the

mitigation obligation may be satisfied within a 10-year period following the first offset. If credit phasing is selected and all mitigation is not completed up front, a mitigation plan will need to be completed in coordination with the SETT prior to any ground disturbance. Mitigation would offset the indirect impacts to GRSG, reducing effects to localized, negligible, and long-term.

Migratory Birds

The Proposed Action would result in temporary loss of up to 9.81 acres of migratory bird nesting and foraging habitat; however, there is adjacent habitat surrounding the project area. Major will hire a qualified biologist to conduct nest surveys prior to any surface disturbing activity during the avian breeding season. Nests and fledglings would not be harmed by the Proposed Action. This measure and the environmental protection measures noted in Appendix B will ensure no direct impacts to migratory birds.

Indirect impacts as a result of the Proposed Action and vegetation removal could lead to temporary spatial redistribution of individuals or habitat-use patterns during the life of the project. It is unlikely that implementing the Project would result in a decline in local or regional migratory bird populations because birds would be able to redistribute, and undisturbed and suitable habitat exists outside of the project area. Impacts to the loss of potential foraging and breeding habitat in the Project Area would be minor, long-term, and localized.

All surface disturbance associated with Project-related activities would be reclaimed, and post-exploration land use is expected to return disturbed land to a level of productivity comparable to pre-exploration levels. Impacts to individual migratory birds in the Project Area would be minor, short term, and localized.

Environmental Effects of the No Action Alternative

Under the No Action alternative, there would be no surface disturbance associated with the Proposed Action and therefore no effects to wildlife, migratory birds, special status species or their habitat.

3.8 Visual Resources

Affected Environment

The project area is entirely located within Visual Resource Management (VRM) Class IV.

The VRM Class IV objective is to provide for management activities, which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and should repeat the basic elements inherent in the characteristic landscape.

Vegetation consists of primarily sagebrush, rabbit brush and grasses in valley bottoms. Colors of vegetation are primarily light grey and green to dark green with some tan. Soil color is primarily tan and grey. Manmade features visibly present in the vicinity would include bladed roads, two-track roads, oil and gas wells and oil storage equipment, powerlines and fencing.

Environmental Effects of the Proposed Action
The visual changes that would result from the Proposed Action are consistent with the objective for VRM Class IV.

There are two main components of the Proposed Action that would be visible and generate contrast: the constructed pad and the drill rig. The drill rig would be visible and the operation likely noticeable from observation points within 3-5 miles in the foreground-middle ground zone during drilling operations. The drill pad and access road would also be discernible from the existing highway. The contrast created by adding the drill rig structure would be high; it would attract attention and would be a dominant feature for the time it is onsite, approximately 30-45 days. These effects may be temporary. If exploration is unsuccessful, the drill rig would be removed, and the pad would be recontoured and seeded, the contrast would initially be low and given enough time with successful revegetation be unnoticeable. To minimize impacts to visual resources as a result of vegetation and soil disturbance, Major would be required as a COA to limit off-road vehicle traffic to what is necessary to construct and reclaim the project area. Exploration drilling effects to Visual resources are expected to be major, short-term, and localized.

If production is achieved the drill rig could be replaced by production and storage facilities within the 350 feet by 350 feet disturbance boundary; this would result in long-term changes in line but inconspicuous changes in color, because the proponent would paint these facilities with a color selected by BLM to blend with the surroundings. Lighting would follow measures to limit impacts on dark skies (Appendix A). If production is achieved, visual resource impacts are expected to be major, long-term, and regional, but consistent with VRM IV.

No Action Alternative
Under the No Action Alternative, the Proposed Action would not occur and no impacts to visual resources would occur. Activities on Federal, State and private lands adjacent to the project area would remain on going as permitted.

3.9 Land Use Authorizations

Affected Environment
Access to the lease boundary is 21 miles north of Warm Springs, via U.S. Highway 6, to the Rattlesnake Springs turn off to Hot Creek Canyon, Nye County Road 545/550. This road is travelled 2.5 miles northwest to the Hot Creek Canyon spur where it bends to the west. Access continues 3 miles west just until the Moore's Station Wash where it intersects a pre-existing two-track road heading south. Major has applied for a ROW (N-99654) for access to the lease boundary using the existing two track road. If granted, the ROW will be just over 3.22 miles in length and 12 feet in width across the entire length with turnouts approximately every mile. The ROW passes through several oil and gas leases held by Major but no other ROWs.

There could be use of the existing two-track by the public for recreation or hunting, or by the grazing allottees to check on water for cattle.

Environmental Consequences
Prior to and during drilling, the ROW and access roads will be used repeatedly. Vehicle traffic

will increase on the Hot Creek Road, possibly resulting in the need to increase maintenance. Major is committed to road repairs and improvements, use of water and gravel as needed, to decrease premature road and vehicle degradation and to keep particulates down. Upon completion of the Project if the no oil production is reached access roads would be reclaimed by removing gravel and scarifying surface. If oil production is achieved, the ROW would be maintained until such time as it is not needed.

No Action Alternative
If the APD was not approved, there would not be the need for the ROW to the lease boundary. The ROW access road would not be repaired, improved, watered or covered with gravel. The turnouts would not be built. There would be no change to land use authorizations under the No Action Alternative as the proposed drill pad and access road would not be constructed.

4 Cumulative Effects

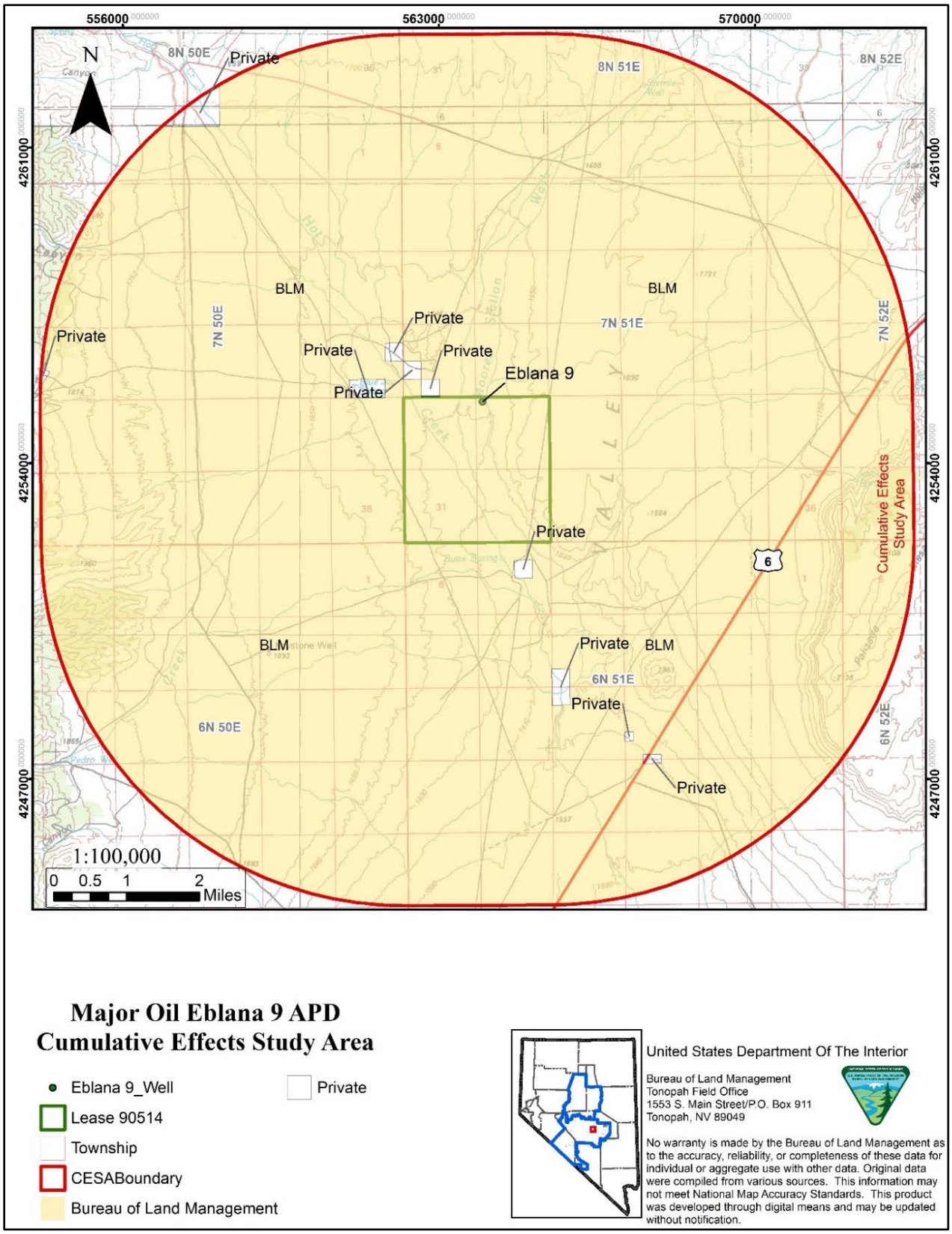
Council on Environmental Quality regulations define cumulative impacts as:

"...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions [RFFAs] regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individual minor but collectively significant actions taken place over a period of time" (40 CFR 1508.7).

These cumulative impacts include both direct and indirect actions occurring as a result of Project activities and how they affect the resources of concern. The significance of impacts should be determined based on context (i.e., the setting of the Project) and intensity (40 CFR 1508.27). Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment (40 CFR 1508.27 (b)(7)). Intensity refers to the severity of the impact (40 CFR 1508.27 (b)). Factors that may be used to define the intensity of effects include the magnitude (relative size or amount of an effect), geographic extent, duration, and frequency of the effects.

This section addresses those cumulative effects in the Cumulative Effects Study Area (CESA) that could result from Project implementation and reasonable alternatives, past actions, present actions, and RFFAs. For the purposes of this analysis and under federal regulations, ‘impacts’ and ‘effects’ are assumed to have the same meaning and are interchangeable.

The geographic scope of a cumulative effect is defined in this EA with the CESA. The CESA represents the maximum spatial extent of effects that could overlap in space and time with those of the Proposed Action. The CESA boundary is a five-mile buffer around the Major lease boundary and encompasses approximately 78,464 acres and is shown below. Inside the CESA there are ten tracts of private land, making up 0.7% of the land surface, public land managed by BLM comprises the remaining 99.3%.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Bureau of Land Management
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Figure 6 Map of cumulative effects study area for the Major Eblana 9 Proposed well.

A 10-year timeframe, both in the past and into the future, was selected for the analysis. This timeframe for considering cumulative effects was selected because it represents the maximum amount of time that effects associated with the Proposed Action are likely to persist.

4.1 Past, Present, and Reasonably Foreseeable Future Actions (RFFAs)

4.1.1 Past and Present Actions

Past and present actions include oil and gas leasing, rights of ways (ROW) construction and maintenance, mineral exploration, grazing, and dispersed recreation.

Oil and Gas Exploration
There are 27 authorized oil and gas lease parcels inside the CESA boundary. Oil and gas leases are present on 64% of BLM managed land within the CESA boundary. Inside the CESA two wildcat oil and gas wells have been drilled and four well pads were constructed. The surface disturbance due to oil and gas disturbance is 4.0 acres total or one acre per well.

Rights of Ways
The BLM's Legacy Rehost System (LR2000) was used to query the various types of ROWs that have been authorized or constructed within the CESA by Section, Township, and Range, and include the following: roads and highways; power transmission; fences; and pipelines. The exact acreage of surface disturbance associated with these ROWs cannot be quantified; however, it is assumed that these types of ROWs and the construction and maintenance associated with these facilities would create a level of surface disturbance that would contribute to cumulative impacts to various resources. The LR2000 database was queried on August 13, 2020, for the CESA. Any newly approved ROWs that have been added to the LR2000 database after this date are not included in the analysis. The approximate total acreages of existing and authorized ROWs within the CESA are included in Table 6 and shown in Figure 7.

Table 4 Past and Present Rights-of-Way Actions in the CESA

Type of Land Use	Quantity	Total Length (miles)	Estimated Disturbance (acres)[1]
Roads	72	90 miles	90-175
Fences	7	7.8 miles	5
Pipelines	2	2 miles	2.5
Transmission lines	1	9 miles	55
Highway	1	9.3 miles	225
Total			462.5

[1] Assumptions: Roads vary 8 to 16 feet width, fences use five feet width, pipelines use ten feet width, transmission lines use 50 feet width, and highways are 200 feet width. Source: Source: BLM LR2000.

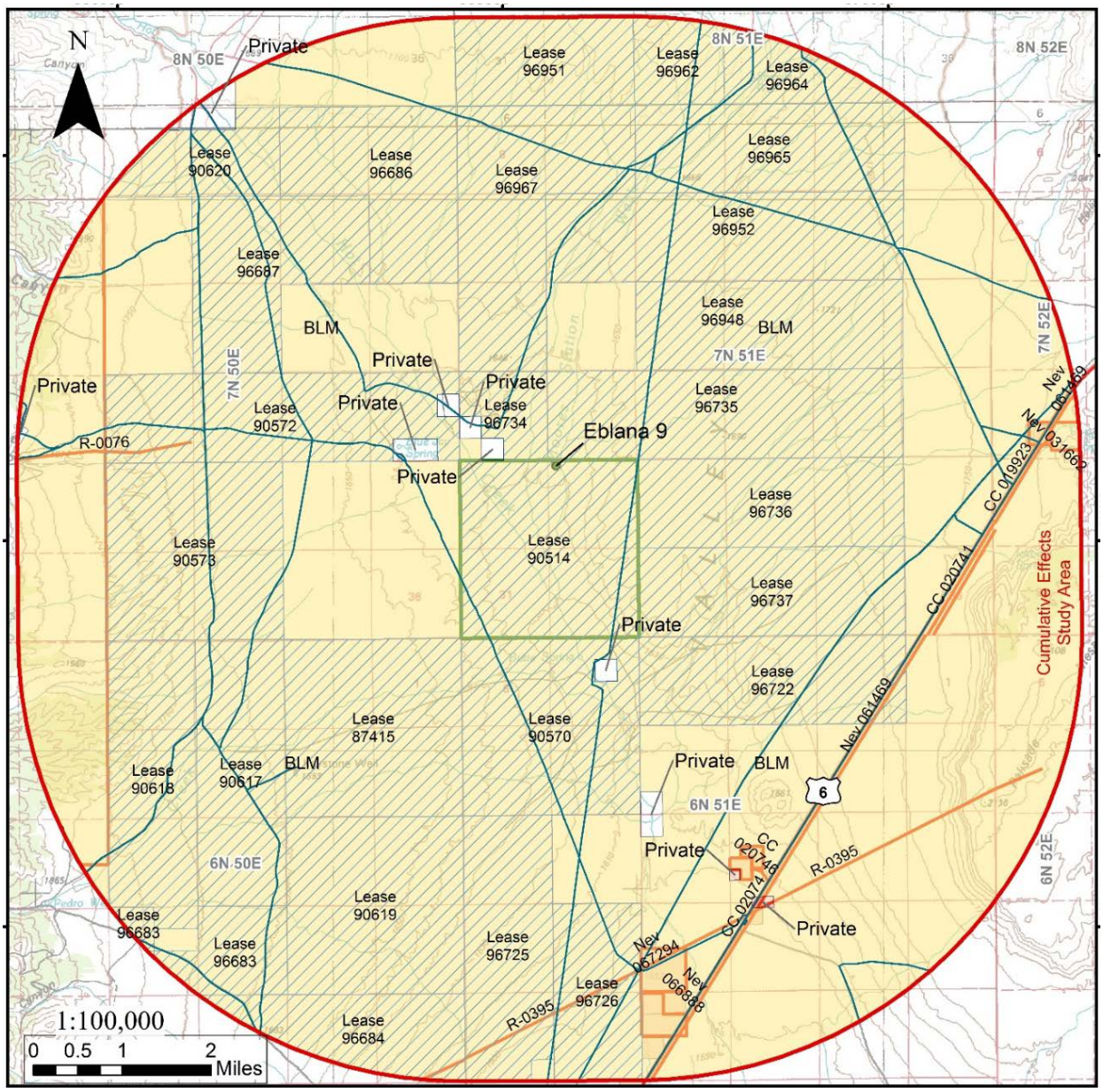

Figure 7 CESA boundary showing oil and gas leases, land status, ROWs, and access roads.

Mining Claims, Mineral Exploration, and Mining

The LR2000 database was queried by Section, Township, and Range to show present or past mineral exploration or mining activities (i.e., expired Notices or plans of operation) that have been issued within the CESA. No current mineral exploration or mining projects have occurred inside the CESA although there are active mining claims and past exploration projects and mineral material sites.

Table 5 Past and present Minerals Actions in the CESA

Type of Mining Claim	Quantity	Size (acres)
Placer	5	100
Lode	60	1240
Type of Disturbance	Quantity	Size (acres)
Notice Level Exploration	24	80
Mineral Material Disposal Sites	4	62
Total		142

1 Source LR2000, queried August 13, 2020

Grazing
The Hot Creek Grazing allotment is 155,677 acres, exceeding, or 100% the size of the CESA.

Dispersed Recreation
Historical and present recreational activities that have occurred and are occurring within the

CESA include primarily dispersed recreation activities such as the following: motorcycle and OHV riding; mountain bicycling; camping; hiking; hunting; photography; and historical sightseeing.

4.1.2 Reasonably Foreseeable Future Actions

The Proposed Action will contribute 4.5 acres of new surface disturbance and 4.81 acres of improvements to existing roads, for a total of 9.28 acres of disturbance. A potential reasonably foreseeable future action (RFFA) is Major going into production with multiple wells within their lease area. Production facilities may include well heads, pumping equipment, a separation system, pipelines, a metering system, storage facilities, water treatment and injection facilities, cathodic protection systems, electrical distribution lines, compressor stations, communication sites, roads, salt water disposal systems, dehydration sites, and fresh and salt water plant sites.

The 1997 Tonopah RMP assumes development in two new oil fields which could result in a total of 102 wells drilled and total disturbance of 370 acres, or 3.6 acres per well. Using the reasonably foreseeable development (RFD) scenario in the RMP, over the next ten years, up to 10 wells could be drilled resulting in up to 36 acres of surface disturbance overall. The Proposed Action, along with future disturbance due to oil well exploration activity would make up 0.06% of the CESA.

Along with oil and gas development, other RFFAs in the area include agricultural developments, livestock grazing, mineral exploration and development, solar or wind energy projects, and recreation. Agricultural developments, such as alfalfa hay farms are present in Hot Creek Valley but not inside the CESA boundary. The Tonopah RMP has 5,974.5 acres of available for direct land sale inside T6N R51E.

New or expansion of livestock grazing in the Hot Creek allotment is not likely as the land is fully used and changes in vegetation and water availability would not likely increase. New mineral exploration or development projects could occur on public land anywhere in the CESA.

Five placer and 60 lode claims are present on the west side representing about 1,340 acres or 1.7% of the CESA. Solar energy projects require wide, level areas relatively close to transmission lines. The CESA contains just a few square miles that could support solar energy projects although no project proposals exist. Wind energy projects require regular, constant wind supply, accessible to transmission lines but there are no project proposals to construct wind energy projects as this time.

The CESA is located adjacent to the Hot Creek Range. The ghost town of Tybo and the Tybo or Morey Mining Districts attract visitors. The Hot Creek Range contains hiking opportunities, charcoal kilns, and animal viewing opportunities. Recreation is a growing in popularity. All terrain vehicle recreationist opportunities exist throughout the area, which require two-track roads. There are 98 miles of roads, or approximately 0.15% of the area inside the CESA.

4.2 Cumulative Impacts to Air Quality, Greenhouse Gases, Climate

Air Quality

Impacts to air quality from RFFAs could result from the generation of dust and combustion emissions from OHV use and recreational traffic on unpaved roads, livestock grazing, road construction and maintenance, vehicle traffic on public roads, mineral exploration and development, and fugitive emissions from recreation. Dust from public traffic on unpaved roads would likely create a low impact to air quality. Impacts from exploration, mining, and reclamation would be regulated by the NDEP/BAPC, the BLM, and the USFS, and impacts to air quality from RFFAs in the CESA would likely be moderate.

The cumulative impact on air quality from the incremental impact of the Proposed Action when added to the past actions, present actions, and RFFAs would be fugitive, point source, and mobile combustion emissions, which would remain moderate. The December 2019 leasing EA analyzed all projected impacts from the lease sale and so presented a cumulative analysis of potential oil and gas impacts. If economic quantities of petroleum were discovered during the exploration project, then the air quality impacts from fugitive dust and emissions related to the Proposed Action would continue for the length of time the drilling phase continued. During production, pipelines leading to tanks outside of the area for loading oil trucks would nearly eliminate the air quality issues. This time period would be considerably longer than the exploration phase, in which the fugitive dusts and emissions generated would end after the 4-week drilling period. The air quality regulations implemented by the NDEP/BAPC and the BLM would help to maintain the moderate condition.

Climate Change

Direct and indirect impacts from the Proposed Action at the local and regional scale are described in Section 3.2 to the extent reasonably foreseeable. The CESA is defined for purposes of climate change analysis in this EA as worldwide; global climate change is innately a cumulative issue as it occurs at the global scale. GHG emissions from highly localized activities such as the Proposed Action must be considered in combination with, and compared to, emissions occurring worldwide. Impacts that occur in the CESA are caused by all anthropogenic activities that result in combustion and release of GHGs, which for purposes of this EA are the past, present, and reasonably foreseeable future actions. The primary sources of

GHG emissions worldwide are agriculture, transportation, electricity generation, industry, and commercial and residential.

In 2014, the United States was contributing about 15 percent of global CO_2 emissions from fossil fuel combustion and some industrial processes (EPA, September 2019). In 2018, the total emissions of GHGs in the United States were 6,677 million metric tons of CO_2 equivalent (EPA, 2020). Total CO_2 emissions from petroleum systems in 2018 in the United States were 36.8 MMT CO_2 (36,814 kt CO_2). The United States reported GHG emissions for the Petroleum and Natural Gas Systems activities was 316 MMT CO_2e from 2,319 facilities. In comparison, Nevada total emissions from GHGs was 17.1 MMT of CO_2 equivalent in 2018 from 43 facilities. This represents approximately five percent of emissions nationwide for this industry. The Proposed Action would represent less than 0.01 percent of Nevada GHG emissions. The Proposed Action itself would contribute negligible impacts in combination with the past, present, and RFFAs at the global scale, and would result in negligible impacts as compared to the global accumulation of GHGs.

4.3 Cumulative Impacts to Noxious Weeds and Invasive, Non-Native Species

Impacts on noxious weeds and invasive, non-native species from RFFAs could result from increased disturbance and vehicle traffic of both equipment and people within the CESA, contributing to the spread of noxious weeds and invasive non-native species. Noxious weeds and invasive species provide fuel for overland fire and make it more difficult for native vegetation to return. Adoption of BMPs and other mitigation measures, along with proactive measures as described in the Noxious Weeds Plan (Appendix D), serve to keep the cumulative impact minor.

4.4 Cumulative Impacts to Floodplains

Past, present and reasonably foreseeable future actions, including the Proposed Action are expected to result in 649 acres of surface disturbance, or less than one percent of the CESA. Hot Creek Valley's seasonally flooded areas, parts of which are within a FEMA-designated 100-year flood zone, could be impacted through increased water velocity over disturbed areas, causing extensive erosion and transport of vegetation. The Proposed Action would use gravel to stabilize access roads and the well pad, decreasing soil erosion and floodplain extension. Further, culverts may be installed in the road base to maintain natural floodplain surface water runoff patterns, to avoid seasonal damming of surface waters by roads, or unintentionally redirecting floodwaters to new locations.

The well pads and access roads would be reclaimed no later than 12 months after projects are determined complete; therefore, the cumulative impacts to floodplain are expected to be temporary and negligible.

4.5 Cumulative Impacts to Soils and Vegetation

Past, present, and RFFAs have resulted in direct loss of vegetation in addition to disturbing and compacting the soil in areas of intensive use such as roads, trails, trough locations, and oil pads. The Proposed Action would temporarily disturb 9.28 acres of vegetation due to well pad and

access road construction. This removal, disturbance, and compaction of the soil reduce the establishment and viability of vegetation. Reclamation and reseeding will be completed if production is not achieved. Loss of native vegetation and soils due to past, present, and RFFAs tend to be dispersed widely across the landscape, which reduces the intensity of the collective effect. Although there are some localized areas of increased erosion potential and compaction, the intensity of the impact has been, and would remain, very low because so few acres have been impacted relative to the size of the CESA, less than one percent.

A limited amount of the vegetation has been and would be impacted by the drilling activities relative to the total amount of vegetation in the CESA. Erosion will be mitigated by placing a layer of gravel onto the newly created access road to provide a satisfactory surface for vehicles to travel and transport the drill rig. By building exploration or production well drill pads as small as practicable, cumulative impacts to soils would be reduced and negligible.

4.6 Cumulative Impacts to Water (Surface and Ground)

Past, present, and RFFA have resulted in minor changes to groundwater. Impacts to water are greatest from groundwater extraction and grazing. Impacts to water resources within Hot Creek Valley and adjacent hydrographic basins have occurred from past and present actions through the issuance of water rights and permits for water development projects. These have included water rights for irrigation, quasi-municipal uses, and livestock watering. The cumulative impact to water resources from the incremental impact of the Proposed Action when added to the past, present, and RFFA water development activities may add additional water usage, though additional impacts to other resources are not expected to approach significance. The effects due to drilling would be short-term, lasting for the duration of the four-week exploration activities if economic quantities of petroleum products are not found. These effects would become longer-term should the Proposed Action enter into a production phase, with the potential to contribute to groundwater drawdown.

4.7 Cumulative Impacts to Wildlife, Migratory Birds, and Special Status Species

Wildlife and Special Status Species

Past and present impacts to wildlife including special status species and migratory birds, within the CESA include all livestock grazing, mineral exploration, mineral development, and recreation. Past and present impacts have resulted in a loss of wildlife habitat, habitat fragmentation and degradation, habitat avoidance, and increased spread of invasive and noxious species.

The Proposed Action and RFFAs within the CESA will incrementally increase the loss of habitat, fragmentation and degradation, and increase spread of noxious weeds or invasive species. The disturbed areas due to the Proposed Action would be reclaimed after the projects are completed. Cumulative effects to wildlife and special status species are expected to be minor and temporary.

4.8 Cumulative Impacts to Visual Resources

Past, present and RFFAs creates short term effects to visual resources; however, the proposed

project is within a Class IV VRM area and the proposed drilling would still meet the objectives of this class. By building exploration or production well drill pads as small as practicable, the impacts to local visual resources would be reduced. If the well is not a producer, a 6-foot-high dry hole marker would be located on the wellhead that could be visible up to 1,000 feet away.

Past oil and gas exploration projects have resulted in 4 acres of disturbance within the CESA. Visual effects similar to those of the Proposed Action are temporary in nature. More permanent oil wells, tanks, pipelines, and transmission lines are required to be painted to match the visual background. These impacts would be consistent with the VRM IV designation throughout the CESA. Cumulatively, past, present, and RFFAs have resulted in 640 acres of disturbance. The Proposed Action adds 9.28 acres and represents less than one percent of total surface disturbance inside the CESA. Cumulative impacts to visual resources are expected to be negligible.

4.9 Cumulative Impacts to Land Use Authorizations

Past and present actions have resulted in 462 acres of surface disturbance. The Proposed Action adds 4.81 acres of disturbance or less than one percent to existing land use authorizations. RFFAs could result in additional uses for the land but must be consistent with the Tonopah RMP. If the proposed well produces oil, additional roads, pipelines, and electrical power lines may be needed to provide access for oil production, additional exploration drilling, and associated construction activities in the area. The existing gravel roads would be the main ingress and egress for these activities. It is possible that more road rights-of-way would be needed for exploration activities. Roads utilized for access would need to be compliant with the BLM regulations and road specifications (9113 BLM Roads Manual) and would be analyzed in site specific environmental analyses. Cumulative impacts to land use authorizations are expected to be minor.

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6 List of Preparers

Table 6 List of Preparers

Resources	Specialists
Cultural Resources and Paleontology	Cassandra Albush
Native American Cultural Concerns	Juan Martinez
Land Use Authorizations	Wendy Seley
Recreation, Visual Resources, Wilderness Characteristics	Alexandra Bettinger
Geology and Minerals	Kristin Reid
Waste, Hazardous and Solid	Kelsey White
Soils, Vegetation, Rangeland Resources	Brian Truax
Air Quality	Frank Giles
Water Resources	Thomas Gibbons
Wildlife Resources and Special Status Species	Brandon Crosby
NEPA compliance	Melissa Jennings

Appendix A: Applicant Committed Environmental Protection Measures

1. Impacts to sensitive and migratory bird species would be reduced or eliminated by one of the following environmental protection measures:
    a. Construction or other ground disturbing activities would be limited to August 1 through February 29, *or*
    b. If construction or other ground disturbing activities would occur during March 1 to July 31, a survey for all migratory bird species, including the snowy plover and burrowing owl, would be required to be completed by a certified wildlife biologist (approved by the BLM) prior to ground disturbing activities. If active migratory bird nests were found, avoidance of the nest location.
4. Any authorized construction and reclamation is to be consistent with the Gold Book (2007 ed.) and BLM Manual 9113 (Engineering Road Standards).
5. The operator shall stockpile a volume equivalent to at least 6 inches of topsoil from the pad and reserve pit for use in reclamation.
6. The operator shall be responsible for the control and eradication of weeds within the Project Area in accordance with the Battle Mountain Integrated Weed Management Plan (NV062EA08-075).
7. If the gravel to construct the proposed drill pad is removed from a nearby abandoned well site and access road, the previously disturbed site would be scarified prior to vacating the site.
8. Maximum width of any road, including drainage ditches and berms, is 30 feet. Culverts and turnouts may be installed if deemed necessary by the Field Manager, Tonopah Field Office.
9. A 25-mph speed limit shall be required for all project vehicles on the project site and unposted access roads.
10. Water shall be the exclusive means to control dust; no dust palliatives shall be used.
11. The operator would design, construct, and maintain enclosure fencing for all open cellars and pits containing freestanding fluids to prevent access by livestock and large forms of wildlife such as deer, elk, and pronghorn. At a minimum, the operator would adequately fence all fluids pits and open cellars during and after drilling operations until the pit is free of fluids and the operator initiates backfilling. The operator would maintain the fence in order to protect public health and safety, wildlife, and livestock.
12. The mud pit shall be fenced on three sides during drilling. Upon completion of the well, when the site is not occupied, the fourth side of the pit shall be fenced. The pit shall remain fenced until reclaimed (see Appendix A).
13. The operator would construct and maintain pits, cellars, open-top tanks, and trenches, that are not otherwise fenced, screened, or netted, to exclude livestock, wildlife, and humans (for example, lined, clean water pits; well cellars; or utility trenches) to prevent livestock, wildlife, and humans from becoming entrapped. At a minimum, the operator

would construct and maintain escape ramps, ladders, or other methods of avian and terrestrial wildlife escape in pits, cellars, open-top tanks, or at frequent intervals along trenches where entrapment hazards may exist.

14. Any additives to the drilling mud that are considered hazardous substances will be stored in appropriate containment to prevent site contamination.
15. The operator would minimize or preclude releases of oil into open pits. Unless the AO approves the release, no oil should go into a pit except in an emergency. The operator must remove any accumulation of oil or condensate in a pit within 48 hours of discovery.
16. Trash shall be contained on-site and hauled to an approved landfill. Burial of trash on-site is not permitted.
17. Portable toilets shall be used for human waste. The latter may not be chemically treated or buried on site.
18. The operator would notify the Bureau of Land Management (BLM) Authorized Officer (AO) and nearest Fish and Wildlife Service (USFWS) Law Enforcement office within 24 hours, if the operator discovers a dead or injured federally protected species (i.e., migratory bird species, bald or golden eagle, or species listed by the FWS as threatened or endangered) in or adjacent to a pit, trench, tank, exhaust stack, or fence. (If the operator is unable to contact the FWS Law Enforcement office, the operator must contact the nearest FWS Ecological Services office.)
19. Any cultural or paleontological resource (historic or prehistoric site or object) or Native American human remains, funerary item, sacred object, or objects of cultural patrimony discovered by the permit holder, or any person working on their behalf, during the course of the road and pad construction shall be immediately reported to the AO by telephone, with written confirmation. The permit holder shall suspend all operations within 100 meters of such discovery and protect it until an evaluation of the discovery is made by the AO.
20. For cultural resources other than Native American human remains, funerary item, sacred object, or objects of cultural patrimony, this evaluation will determine the significance of the discovery and what environmental protection measures are necessary to allow activities to proceed. The permit holder is responsible for the cost of evaluation and mitigation. Any decision on treatment and/or mitigation will be made by the AO after consulting with the permit holder. Operations may resume only upon written authorization to proceed from the AO.
21. To mitigate the effects to visual resources if production is obtained, the proponent would paint the production and storage facilitates with Covert Green or Sand Beige paint if the well produces oil (additional environmental analysis would be required if production and/or storage facilities are necessary and exceed the 240 feet x 360 feet disturbance boundary, plus 100 feet buffer).
22. Utilize consistent lighting mitigation measures that follow “Dark Sky” lighting practices. Effective lighting should have screens that do not allow the bulb to shine up or out. All proposed lighting shall be located to avoid light pollution onto any adjacent lands as viewed from a distance. All lighting fixtures shall be hooded and shielded, face

downward, located within soffits and directed on to the pertinent site only, and away from adjacent parcels or areas.

23. Utilize consistent mitigation measures that address logical placement of improvements and use of appropriate screening and structure colors. Existing utility corridors, roads and areas of disturbed land should be utilized wherever possible. Proliferation of new roads should be avoided. For example, the use of compatible paint colors on structures reduces the visual impacts of the built environment. Using screening, careful site placement, and cognitive use of earth-tone colors/materials that match the environment improve the user experience for others who might have different values than what is fostered by built environment activities.
24. Any required FAA lighting should be consolidated and minimized wherever possible.
25. The Operator is responsible for compliance with provisions of the Clean Water Act, Safe Drinking Water Act, and applicable State laws and regulations regarding protection of state water resources. Operators should contact Nevada Division of Water Resources and Nevada Division of Environmental Protection regarding necessary permits and compliance measures for any construction or other activities.
26. Onshore Order No. 2 and 43CFR §3162.5-2: The operator shall isolate freshwater-bearing and other usable water containing 5,000 ppm or less of dissolved solids and other mineral-bearing formations and protect them from contamination. Tests and surveys of the effectiveness of such measures shall be conducted by the operator using procedures and practices approved or prescribed by the AO.
27. All survey monuments found within the area of operations shall be protected. Survey monuments include, but are not limited to: General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U. S. Coast and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any survey monuments, the incident shall be reported in writing to the Authorized Officer.
28. Upon the proper plugging and abandonment of the well, the proponent would remove as much gravel as practicable from the proposed well pad and scarify the area

Appendix B General Requirements for Construction, Surface Use, and Operations

Drilling Operations

1. The anticipated spud date will be reported orally to the BLM Petroleum Engineer and Petroleum Engineering Technician 24 HOURS PRIOR TO SPUDDING, followed up by submitting Form 3160- 5 with actual spud date and time to the BLM.
2. Daily drilling and completion progress reports shall be submitted to the BLM Agency Contacts on a daily basis and continuing until the well is completed, and shall include daily mud reports, details of casing that has been run and its cementing, water flows, lost circulation zones, hydrocarbon shows and other information that describes drilling conditions. The reports shall be emailed (refer to Agency Contacts).
3. A Tonopah Field Office AO shall be contacted for a verbal approval prior to commencing remedial work, plugging operations on newly drilled boreholes, changes within the drilling plan, changes or variances to the blowout preventer equipment (BOPE), deviating from conditions of approval, and conducting other operations not specified within the APD. Air and/or mist drilling requires BLM Petroleum Engineer notification and approval. If the AO is not available, please contact the Petroleum Engineer or Petroleum Engineering Technician in the prescribed order.
4. Flexible choke lines shall meet or exceed the API SPEC 16C requirements. Flexible choke lines shall have flanged connections and configured to the manufacturer's specifications. The flexible choke lines shall be anchored in a safe and workmanlike manner. At minimum, all connections shall be effectively anchored in place for safety of the personal on location. Manufacturer specifications shall be kept with the drilling rig at all times and immediately supplied to the Authorized Officer (AO) or inspector upon request. Specifications at a minimum shall include acceptable bend radius, heat range, anchoring, and the working pressure. All flexible choke lines shall be free of gouges, deformations, and as straight/short as possible.
5. A Hydrogen Sulfide (H2S) Contingency Plan as outlined in Onshore Order No. 6 will be submitted when required by this office. However, minimum safety precautions must always be taken. Personal safety equipment, including a portable hydrogen sulfide detector situated in a position to detect gas from the well, and two or more OSHA approved protective breathing apparatus must be on location. If company policy requires more than this, please supply this office with a copy of the company plan or requirement, if not already submitted.
6. If included in drilling program and/or required by AO, the gas buster shall be functional and all flare lines effectively anchored in place, prior to drilling out the surface casing shoe. The discharge of the flare lines shall be a minimum of 100 feet from the wellhead and targeted at bends. The panic line shall be a separate line (not open inside the buffer tank) and effectively anchored. All lines shall be downwind of the prevailing wind direction and directed into a flare pit, which cannot be the reserve pit. The flare system shall use an automatic ignition. Where noncombustible gas is likely or expected to be vented, the system shall be provided supplemental fuel for ignition and maintain a

continuous flare.

7. Nevada State Office personnel shall be contacted for approval prior to running non-API (American Petroleum Institute) Standard casing downhole.
8. Prior to running used or reconditioned API-grade casing downhole, a petroleum engineer in the Nevada State Office shall be contacted to obtain approval as per Onshore Order No.1
9. All cement bond logs shall be run by the logging company at zero pressure. Logs determined to be run under pressure shall be re-run.
10. Gamma Ray Log shall be run from total depth to surface
11. Notice: if no logs are run (mud or electric), all open sections of hole will be filled with cement in a manner which precludes interzonal migration of fluids.
12. Directional surveys (inclination and azimuth) shall be run on the well wherever the inclination exceeds 10 degrees, or the projected bottom hole location is within 200 feet of the spacing unit or lease or unit boundary.
13. If a well control issue or failed test (e.g. kick, blowout, water flow, casing failure, or a bradenhead pressure increase) arises during drilling or completions operations, the Petroleum Engineer shall be notified within 24 hours from the time of the event. IADC/Driller's Logs and Pason Logs (mud logs) shall be forwarded to Agency Contacts.
14. The State of Nevada (NAC 522A.215) requires that samples of cuttings shall be collected at a minimum of 30-foot intervals from surface to the surface casing point, and on 10-foot intervals from surface casing shoe to total depth. A minimum of two 15 milliliter sets of cuttings per sampling interval must be cleaned, dried, and placed in 3" x 5" sample envelopes, properly identified and sent prepaid to the Nevada Bureau of Mines and Geology (NBMG) University of Nevada, Reno, Mail Stop 178, Reno, Nevada 89557-0088.

    Note: the cuttings are not to be sent to the Division of Minerals. The cuttings are due within 15 days of completion of the well. The operator will be responsible for the cost of any further handling of the samples by the NBMG required to meet standards set out in this permit condition.

Pressure Control and Testing

15. The BOPE shall be installed, tested, and operated in conformance with Onshore Order #2.
16. The BOPE will be tested according to specified procedures in Approved Application to Permit Drilling and Drilling Program.
17. All tests are required to be recorded on a calibrated test chart/graph and in the IADC/Driller's log.
18. All BOPE tests of 5000 psi or greater shall be conducted by an independent contractor.
19. The results of the BOPE test shall be reported to the Bureau of Land Management. Please submit the test chart to the regulatory agencies (refer to Agency Contacts).

Well Testing, Completion and Subsequent Well Operations

20. Pursuant to 43 CFR 3162.7-1(b), production testing will be permitted into test tanks only. No oil will be permitted into the reserve pit except in emergency situations.
21. If after drilling of the well is completed hydraulic fracturing is proposed, prior approval and further NEPA analysis will be needed
22. Whether the well is completed as a dry hole or as a producer, a standard Form 3160-4, Well Completion or Recompletion Report and Log shall be submitted not later than 30 days after completion of the well or after completion operations being performed. In accordance with 43 CFR subpart 3160.0-9 and 3162.4-1(b), the report shall include:
    a. The spud date, casing information such as size, grade, weight, hole size, and setting depth, amount and type of cement used, top of cement, depth of cementing tools, casing test method, intervals tested, perforated, acidized, fractured and results obtained and the dates all work done.
    b. Copies of the mud/drilling log, driller's event log/operations summary report, production test volumes, directional survey, and Formation Integrity Test (FIT) results.
    c. Two complete copies of electrical/mechanical logs in LAS format or hard copies. Please contact BLM Petroleum Engineer if there are any questions.
23. Two copies of all logs run on the well and where possible, one copy of the computed logs in electronic format such as LAS or PDF are to be submitted to the NDOM within 30 days of the date of being run.
24. If the well is productive and it is determined that the reservoir extends beyond the lease boundary a Communization Agreement may be set up.
25. No later than the fifth business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, the operator must notify the BLM by letter or sundry notice of the date on which such production commenced. The date is defined as follows: the date on which liquid hydrocarbons are first sold or shipped from a temporary storage facility, such as a test tank, and for which a run ticket is required to be generated, or the date on which liquid hydrocarbons are first produced into a permanent storage facility, whichever occurs first. If you intend to sell from a test tank, it must be calibrated as specified 43 CFR subpart 3174 and sealed in accordance with 43 CFR subpart 3173. You can initially notify orally, but you must follow-up with a letter or sundry notice. Reference is made to 43 CFR 3162.4-1(c). As a minimum, such notice must provide the following information:
    a. Operator's name, address, and telephone number.
    b. Well name and number.
    c. Well location (¼ ¼ Section, Twp., Rge., MDBM).
    d. Date well placed in a producing status.
    e. The nature of the well's production, i.e., crude oil, natural gas.
    f. The lease communization, or unit number applicable.

58. Standard Form 3160-5, Sundry Notice and Report on Wells shall be filed electronically for approval for all changes of plans and other operations in accordance with 43 CFR subpart 3173.10. For more information regarding access to AFMSS and Well Information Systems, please contact the Authorized Officer.
59. In accordance with 43 CFR subpart 3173.11, a site facility diagram shall be submitted electronically via standard Form 3160-5 within thirty (30) days after the facility becomes operational.
60. All oil, other hydrocarbons, and gas produced, stored, removed, or sold from a lease, communitized area, or unit participating area must be handled in accordance with the requirements of 43 CFR subparts 3160, 3170, 3173, 3174, 3175, 3178, and 3179. All measurement must be on the lease, communitized area, or unit from which the oil originated and must not be commingled with oil originating from other sources, unless approved by the authorized officer under the provisions of 43 CFR subpart 3173.
61. Unless prohibited by the Authorized Officer, produced water from newly completed wells may be temporarily disposed of into pits for a period of up to 90 days, if the use of the pit was approved as a part of an APD. Any extension of time beyond this period requires documented approval by the Authorized Officer.

Abandonment

62. Abandonment program approval must be obtained prior to plugging the well. Following an oral approval, a sundry notice titled "Notice of Intent to Abandon" will be submitted within five business days. Failure to obtain approval prior to commencement of abandonment operations shall result in immediate assessment under 43 CFR 3163.1(b)(3).
63. Upon abandonment, the operator shall:
    a. Remove all trash and debris from the site and dispose of it properly.
    b. Re-contour the mud pit to as near original grade as possible and spread stockpiled topsoil over the covered pit.
    c. Remove any culverts installed.
    d. Rehabilitate the drill pad by stripping as much gravel as possible from the pad and re-contouring. The operator shall also reduce the berm and cover any remaining gravel with the soil from the pad and mud pit excavation. The drill pad will be scarified and re-seeded with the BLM recommended seed mix.
    e. Reclaim existing roads that are improved to their original condition by removing turnout improvements. Imported gravel at the turnouts will be removed to restore the original surface.

Appendix C: Special Status Species List

All species listed here are Nevada BLM Sensitive Species as designated by the State Director and are identified on the State Director's list as occurring in the Battle Mountain District, as of October 1, 2017. Criteria set forth in the BLM 6840 Manual for designating sensitive species are:

1. Species designated as Bureau sensitive must be native species found on BLM administrated lands for which BLM has the capability to significantly affect the conservation status of the species through management, and either:
   a. There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range, or
   b. The species depends on ecological refugia or specialized or unique habitats on BLM-administrated lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.

2. All federally designated candidate species, proposed species, and delisted species in the 5 years following their delisting shall be conserved as Bureau sensitive species.

Species listed by U.S. Fish and Wildlife Service under the Endangered Species Act are identified in the first part of the table below (all are also Nevada BLM Sensitive species).

Appendix C Table 1 Battle Mountain District Endangered and Threatened Species List

Battle Mountain District *Endangered and Threatened* Species List		
Plants Common Name (4)	**Scientific Name**	**Federal Status**
Spring-loving centaury	*Centarium namophilum*	Threatened
Ash Meadows mousetails	*Ivesia kingii var. eremica*	Threatened
Armagosa niterwort	*Nitrophila mohavensis*	Endangered
Whitebark pine	*Pinus albicaulis*	Candidate
Bird Common Name (3)	**Scientific Name**	**Federal Status**
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	Threatened
Southwestern willow flycatcher	*Empidonax trailii extimus*	Endangered
Ridgway's rail (Yuma clapper rail)	*Rallus obsoletus yumanensis*	Endangered
Reptile Common Name (1)	**Scientific Name**	**Federal Status**
Desert Tortoise	*Gopherus agassizii*	Threatened
Fish Common Name (2)	**Scientific Name**	**Federal Status**
Railroad Valley springfish	*Crenichthys nevadae*	Threatened
Lahontan cutthroat trout	*Oncorhynchus clarkii henshawi*	Threatened

Appendix C Table 2 Battle Mountain District Special Status Plant Species List

Battle Mountain District *Special Status* Plant Species List (32)	
Common Name	**Scientific Name**
Eastwood milkweed	*Asclepias eastwoodiana*
Cima milkvetch	*Astragalus cimae* var. *cimae*
Tonopah milkvetch	*Astragalus pseudiodanthus*
Toquima milkvetch	*Astragalus toquimanus*
Currant milkvetch	*Astragalus uncialis*
Elko rockcress	*Boechera falcifructa*
Monte Neva paintbrush	*Castilleja salsuginosa*
Tecopa birdbeak	*Cordylanthus tecopensis*
Mojave (Virgin River) thistle	*Circium mohavense (C. virginense)*
Goodrich biscuitroot	*Cymopterus goodrichii*
Nevada willowherb	*Epilobium nevadense*
Windloving buckwheat	*Eriogonum anemophilum*
Beatley buckwheat	*Eriogonum beatleyae*
Deeth buckwheat	*Eriogonum nutans* var. *glabratum*
Tiehm buckwheat	*Eriogonum tiehmii*
Sand cholla	*Grusonia pulchella*
Alkali ivesia	*Ivesia kingii* var. *kingii*
Lunar Crater buckwheat	*Johanneshowellia crateriorum*
Davis peppercress	*Lepidium davisii*
Holmgren lupine	*Lupinus holmgrenianus*
Low feverfew	*Parthenium ligulatum*
Pahute Mesa beardtongue	*Penstemon pahutensis*
Lahontan beardtongue	*Penstemon palmeri* var. *macranthus*
Bashful beardtongue	*Penstemon pudicus*
Tiehm beardtongue	*Penstemon tiehmii*
Clarke phacelia	*Phacelia filiae*
Reese River phacelia	*Phacelia glaberrima*
Williams combleaf	*Polyctenium williamsiae*
Blaine pincushion	*Sclerocactus blainei*
Nye (Tonopah) pincushion	*Sclerocactus nyensis*
Railroad Valley globemallow	*Sphaeralcea caespitosa* var. *williamsiae*
Lone Mountain goldenheads	*Tonestus graniticus*

Appendix C Table 3 Battle Mountain District Special Status Animal Species List

Battle Mountain District Special Status Animal Species List	
Bird Common Name (26)	**Scientific Name**
Northern goshawk	*Accipiter gentilis*
Golden eagle	*Aquila chrysaetos*
Short-eared owl	*Asio flammeus*
Burrowing owl	*Athene cunicularia*
Ferruginous hawk	*Buteo regalis*
Swainson's hawk	*Buteo swainsoni*
Greater sage-grouse	*Centrocercus urophasianus*
Western snowy plover (not protected Pacific Coast DPS)	*Charadrius nivosus nivosus*
Great Basin willow flycatcher	*Empidonax traillii odastus*
Peregrine falcon	*Falco peregrinus*
Sandhill crane	*Antigone canadensis*
Pinyon jay	*Gymnorhinus cyanocephalus*
Bald eagle	*Halioeetus leucocephalus*
Least bittern	*Ixobrychus exilis*
Loggerhead shrike	*Lanius ludovicianus*
Black rosy-finch	*Leucosticte atrata*
Gray-crowned rosy-finch	*Leucosticte tephrocotis*
Lewis' woodpecker	*Melanerpes lewis*
Long-billed curlew	*Numenius americanus*
Mountain quail	*Oreortyx pictus*
Sage thrasher	*Oreoscoptes montanus*
Phainopepla	*Phainopepla nitens*
Flammulated owl	*Psiloscops flammeolus*
Brewer's sparrow	*Spizella breweri*
Crissal thrasher	*Toxostoma crissale*
LeConte’s thrasher	*Toxostoma lecontei*
Fish Common Name (9)	**Scientific Name**
Big Smoky Valley speckled dace	*Rhinichthys osculus lariversi*
Monitor Valley speckled dace	*Rhinichthys osculus ssp. 5*
Oasis Valley speckled dace	*Rhinichthys osculus ssp. 6*
Fish Lake Valley tui chub	*Siphateles bicolor ssp. 4*
Hot Creek Valley tui chub	*Siphateles bicolor ssp. 5*
Little Fish Lake Valley tui chub	*Siphateles bicolor ssp. 6*
Railroad Valley tui chub	*Siphateles bicolor ssp. 7*
Big Smoky Valley tui chub	*Siphateles bicolor ssp. 8*
Charnock Ranch (Charnock Springs) tui chub	*Siphateles bicolor ssp. 10*

Battle Mountain District Special Status Animal Species List	
Mammals Common Name (31)	**Scientific Name**
Pallid bat	*Antrozous pallidus*
Pygmy rabbit	*Brachylagus idahoensis*
Desert pocket mouse	*Chaetodipus penicillatus*
Townsend's big-eared bat	*Corynorhinus townsendii*
Big brown bat	*Eptesicus fuscus*
Spotted bat	*Euderma maculatum*
Greater western mastiff bat	*Eumops perotis*
Allen's big-eared (lappet-browed) bat	*Idionycteris phyllotis*
Silver-haired bat	*Lasionycteris noctivagans*
Western red bat	*Lasiurus blossevillii*
Hoary bat	*Lasiurus cinereus*
Dark kangaroo mouse (includes Desert Valley and Fletcher)	*Microdipodops megacephalus ssp.*
Pale kangaroo mouse	*Microdipodops pallidus*
Pahranagat Valley montane vole	*Microtus montanus fucosus*
California myotis	*Myotis californicus*
Western small-footed myotis	*Myotis ciliolabrum*
Long-eared myotis	*Myotis evotis*
Little brown bat	*Myotis lucifugus*
Fringed myotis	*Myotis thysanodes*
Cave myotis	*Myotis velifer*
Long-legged myotis	*Myotis volans*
Yuma myotis	*Myotis yumanensis*
Big free-tailed bat	*Nyctinomops macrotis*
Canyon bat (formerly western pipistrelle)	*Parastrellus hesperus*
Bighorn sheep	*Ovis canadensis ssp.*
Merriam's shrew	*Sorex merriami*
American water shrew	*Sorex pallustrus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Botta's pocket gopher	*Thomomys bottae*
Fish Spring pocket gopher	*Thomomys bottae abstrusus*
San Antonio pocket gopher	*Thomomys bottae curatus*
Amphibian Common Name (4)	**Scientific Name**
Western toad	*Anaxyrus boreas*
Amargosa toad	*Anaxyrus nelsoni*
Northern leopard frog	*Lithobates pipiens*
Columbia spotted frog	*Rana luteiventris*

Battle Mountain District Special Status Animal Species List	
Reptile Common Name (6)	**Scientific Name**
Great Basin collared lizard	*Crotaphytus bicinctores*
Long-nosed leopard lizard	*Gambelia wislizenii*
Pygmy short-horned lizard	*Phrynosoma douglassii*
Greater short-horned lizard	*Phrynosoma hernandesi*
Desert horned lizard	*Phrynosoma platyrhinos*
Western red-tailed skink	*Plestiodon [Eumeces] gilberti rubricaudatus*
Mollusc Common Name (9)	**Scientific Name**
California floater	*Anodonta californiensis*
Western ridged mussel	*Gonidea angulata*
Duckwater pyrg	*Pyrgulopsis aloba*
Southern Duckwater pyrg	*Pyrgulopsis anatina*
Large-gland Carico pyrg	*Pyrgulopsis basiglans*
Carinate Duckwater pyrg	*Pyrgulopsis carinata*
Oasis Valley pyrg	*Pyrgulopsis micrococcus*
Ovate Cain Spring pyrg	*Pyrgulopsis pictilis*
Duckwater Warm Springs pyrg	*Pyrgulopsis villacampae*
Ant, Wasp, Bee Common Name (2)	**Scientific Name**
Mojave gypsum bee	*Andrena balsamorhizae*
Mojave poppy bee	*Perdita meconis*
True Bug Common Name (1)	**Scientific Name**
Pahranagat naucorid bug	*Pelocoris shoshone shoshone*
Beetle Common Name (4)	**Scientific Name**
Crescent Dunes aegialian scarab	*Aegialia crescenta*
Aegialian scarab beetle	*Aegialia knighti*
Crescent Dunes aphodius scarab	*Aphodius ssp. 2*
Crescent Dunes serican scarab	*Serica ammomenisco*
Butterfly Common Name (7)	**Scientific Name**
Big Smoky wood nymph	*Cercyonis oetus alkalorum*
White River wood nymph	*Cercyonis pegala pluvialis*
Monarch butterfly	*Danaus plexippus plexippus*
White Mountains skipper	*Hesperia miriamae longaevicola*
Railroad Valley skipper	*Hesperia uncas fulvapalla*
White River Valley skipper	*Hesperia uncas grandiosa*
Great Basin small blue	*Philotiella speciosa septentrionalis*

Appendix D Noxious Weeds

The State of Nevada and the Tonopah District Office both recognize two categories of weeds as noxious and invasive. Noxious weeds are defined as plants designated by federal or state laws as generally possessing one of more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insect of disease; or nonnative, new or not common to the U.S. An invasive plants is defined as a plant that is not part of (if exotic) or a minor component of (if native) the original plant community or communities, and has the potential to become a dominate or co-dominate species on the site if future establishment and growth are not actively controlled by management interventions; or a plant that is classified as exotic or noxious under state or federal law. Species that become dominant for only one to several years (e.g. short-term response to drought or wildfire) are not invasive plants.

Perennial noxious weeds (Pepperweed, salt cedar, hoary cress and Russian Knapweed) and invasive species (cheatgrass, mustard, Russian thistle, and halogeton) were previously inventoried in Railroad Valley. Vegetation growth and invasive species will be monitored on a regular basis and managed as directed by the BLM. Invasive and or noxious weeds will be controlled using techniques approved by the BLM as outlined in The Gold Book Environmental Best Management Practices (BMPs).

Table 7 Noxious Weeds of Nevada

Common Name	Scientific Name
Borage family	***Boraginaceae***
Houndstongue	*Cynoglossum officinale*
African rue	*Peganum harmala*
Puncturevine	*Tribulus terrestris*
Syrian beancaper	*Zygophyllum fabago*
Figwort family	***Scrophulariaceae***
Dalmatian toadflax	*Linaria dalmatica*
Yellow toadflax	*Linaria vulgaris*
Grass family	***Poaceae***
Crimson fountaingrass	*Pennisetum setaceum*
Giant reed	*Arundo donax*
Johnsongrass	*Sorghum halepense*
Medusahead	*Taeniatherum caput-medusae*
Loosestrife family	***Lythraceae***
Purple loosestrife	*Lythrum salicaria*
Mint family	***Lamiaceae***
Mediterranean sage	*Salvia aethiopis*
Mustard family	***Brassicaceae***
African mustard	*Brassica tournefortii*
Austrian fieldcress	*Rorippa austriaca*

Common Name	Scientific Name
Dyer's woad	*Isatis tinctorial*
Hoary cress	*Cardaria* spp.
Perennial pepperweed	*Lepidium latifolium*
Nightshade family	***Solanaceae***
Black henbane	*Hyoscyamus niger*
Horsenettle	*Solanum carolinense*
Silverleaf nightshade	*Solanum elaeagnifolium*
Parsley family	***Apiaceae***
Poison-hemlock	*Conium maculatum*
Waterhemlock	*Cicuta* spp.
Pea family	***Fabaceae***
Camelthorn	*Alhagi maurorum*
Goatsrue	*Galega officinalis*
Swainsonpea	*Sphaerophysa salsula*
Rose family	***Rosaceae***
Sulfur cinquefoil	*Potentilla recta*
Salvinia family	***Salviniaceae***
Giant salvinia	*Salvinia molesta*
Spurge family	***Euphorbiaceae***
Leafy spurge	*Euphorbia esula*
Sunflower family	***Asteraceae***
Canada thisle	*Cirsium arvense*
Common cupina	*Crupina vulgaris*
Common St. Johnswort	*Hypericum perforatum*
Diffuse knapweed	*Centaurea diffusa*
berian starthistle	*Centaurea iberica*
Malta starthistle	*Centaurea melitensis*
Mayweed chamomile	*Anthemis cotula*
Musk thistle	*Carduus nutans*
Perennial sowthistle	*Sonchus arvensis*
Purple starthistle	*Centaurea calcitrapa*
Rush skeletonweed	*Chondrilla juncea*
Russian knapweed	*Acroptilon repens*
Scotch thistle	*Onopordum acanthium*
Spotted knapweed	*Centaurea biebersteinii*
Squarrose knapweed	*Centaurea virgata* var.*squarrosa*
Yellow starthistle	*Centaurea solstitialis*
Tamarisk family	***Tamaricaceae***
Saltcedar	*Tamarix ramosissima*
Watermilfoil family	***Halorgaceae***
Eurasian watermilfoil	*Myriophyllum spicatum*
Waterweed family	***Hydrocharitaceae***
Hydrilla	*Hydrilla verticillata*

Appendix E Spill Prevention Plan

Major Oil International LLC
Eblana 9 Oil Well
Spill Response and Contingency Plan

1. Introduction

Major Oil International LLC submits this Spill Response and Contingency Plan (Plan) for the proposed Eblana 9 exploration oil and gas well on BLM Oil and Gas Lease NVN-90514.

Project activities will consist of constructing the access road and drill pad, groundwater well drilling and construction, oil exploration drilling, groundwater extraction, resource testing, well plugging and abandonment, and reclamation.

1.1. Location and Access

The Project is located in the NW¼ NW¼, Section 29, T7N R51E, MDB & M in Nye County, Nevada. The access road is just off U.S. Highway 6, in Hot Creek Valley, approximately 55 miles north of Tonopah, Nevada at an elevation of about 5,340 feet above sea level.

1.2. Surface Drainage

The Project area is located inside the Moore's Creek and Hot Creek stream channel, FEMA flood hazard Zone A, which has a one percent (1%) annual chance (100-year flood) of flooding. The Project location and road construction will parallel the merged channels but several low flow channel crossings will require gravel or culvert if thunderstorms develop to the west and north over the Hot Creek Range, which can result in overland flow in and around the "Big Wash" ephemeral drainage system.

1.3. Well pad location of vessels

The diagram below shows the general location of tanks and vessels on the well pad while drilling.

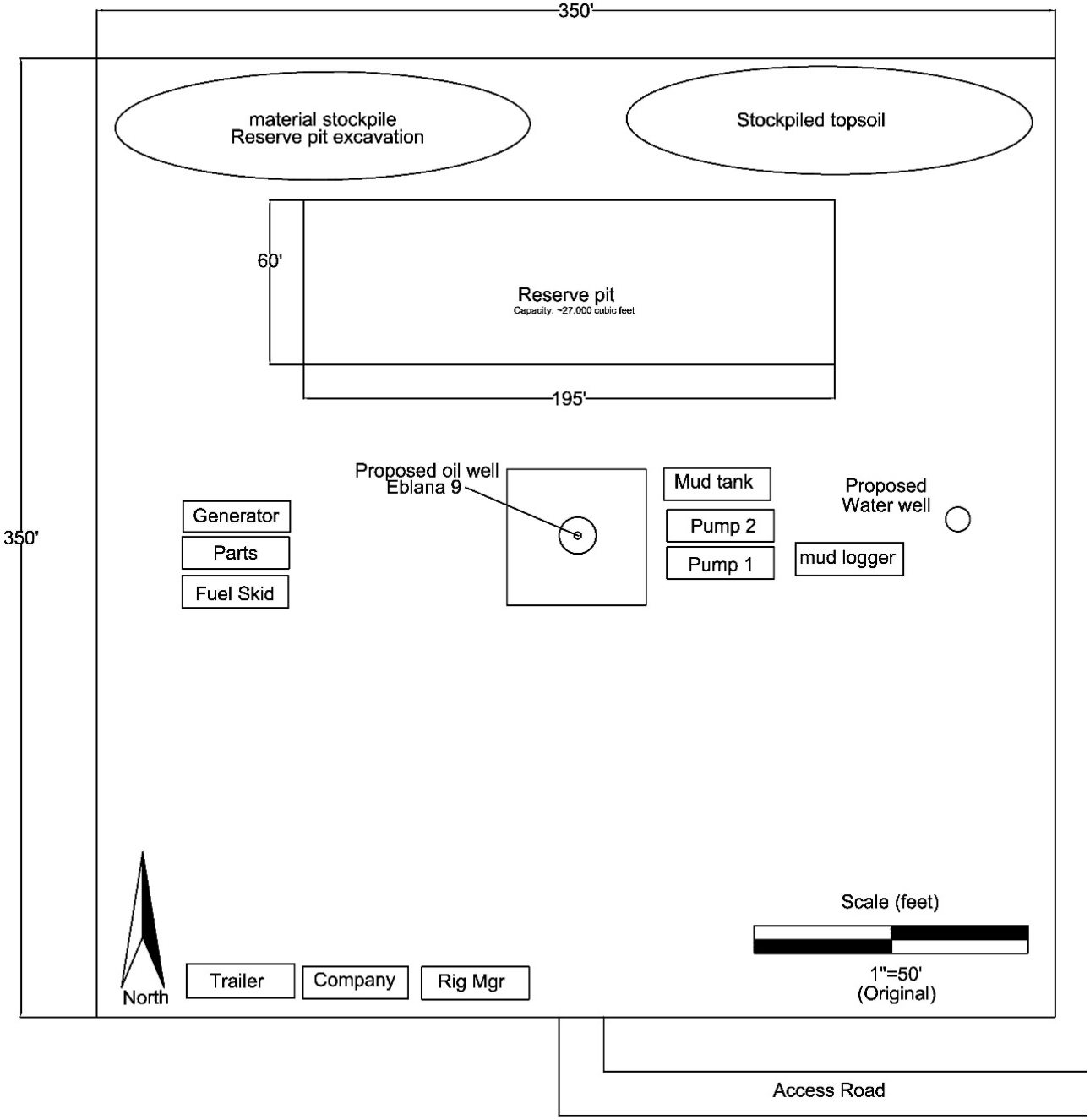

Figure 8 General layout of well pad

2. Spill Response and Contingency Plan

The purpose of this plans is to:

- Identify all potential sources of pollutants that may exist within the project area.
- Identify Best Management Practices (BMPs) to prevent or reduce the quantity of potential pollutants discharged to the ground or surface water in order to minimize environmental impacts during and after the drilling exploration project.
- Establish methods for preventing and responding to spills and outline responsibilities for notification of various state and federal agencies in the event of a release.

2.1. Sources of potential pollutants

A copy of this plan shall be attached to the Project's approved APD, along with the Safety Data Sheets (SDS) for Petroleum Products used on site for vehicle maintenance and operation, and potential hydrocarbons discovered during the drilling of the exploration well. This will include all hazardous materials that are used on site, including drilling products (see Spill Prevention Plan). All contractors are responsible for familiarizing their personnel with the information pertaining to BMPs and spill prevention.

2.2. Release Prevention

Good housekeeping practices will be followed on site during the Project:

- Only enough drilling products to do the job will be stored on location.
- Products will be kept in a neat, orderly manner.
- Products will be kept in their original containers with the original manufacturer's label.
- Transfer containers will be labelled according to their content and covered.

Produced fluid from the exploration well might contain contaminants and will be managed in accordance with BLM On Shore Orders 2 and 7. Safety measures will be used to prevent uncontrolled flow as outlined in the proposed drilling plan. Equipment that use hydrocarbons (diesel engines, vehicles, light plants) will be maintained to prevent leaks.

It is the responsibility of the operator, mechanic, tool pusher or other designee, to execute the repairs or preventive maintenance and complete any reporting required. Assignment for repair when equipment is in a remote location may be issued verbally by field superintendent or district manager.

2.3. Spill Contingency Plan

Materials and equipment necessary for spill clean-up will be kept on site. Equipment and materials will include but not be limited to rags, gloves, goggles, sorbent materials, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

In the event of oil, fuel, or lubrication grease leaks, cleanup will be conducted as quickly as possible. Clean-up products, sorbent products, or sheeting that are used to temporarily catch spills will be disposed of according to federal, state, or local regulations. If the leak occurs on

soil, the contaminated soil will be removed and disposed of according to federal, state, or local regulations.

2.4. Best Management Practices

All spills or leakages of oil, gas, salt water, toxic liquids or waste materials, blowouts, fires, personal injuries, and fatalities shall be reported by the operator to the BLM in accordance with the requirements of *Notice to Lessees NTL-3A; Reporting of Undesirable Events,* and in accordance with any applicable local requirements (Gold Book).

It is the responsibility of the contractor to define staging areas to minimize footprint impacts, and to prevent impacts to water courses and other sensitive areas. The contractor is responsible for maintaining water-tight trash bins or dumpsters on the Project site to minimize leakage to ground surface. Contractors will be responsible for maintaining contained areas for concrete wash-out and properly disposing of concrete, if used.

2.5. Release Response, Handling, and Clean-Up

In the event of any release, the Project Manager or designee will be responsible for initiating measures to abate the release. As soon as possible following characterization and containment of the release, appropriate clean-up efforts will be initiated. Precautions will be taken to avoid personnel exposure, explosion, fire, or other potential dangers associated with chemical spills and measures will be undertaken to prevent releases beyond engineered containment structures.

2.6. Notification Requirements

Depending on the type and quantity of material spilled, notification of one or more of the following will be required:

1. BLM. Tonopah Field Office, Assistant Field Manager, Non-renewable Resources.
2. Nevada Division of Environmental Protection (NDEP), Bureau of Corrective Actions;
3. National Response Center and Nevada Division of Emergency Management; and
4. State Emergency Response Commission and Local Emergency Planning Committee.

Once the size and source of the release and the types and quantities of potentially hazardous constituents in the release have been identified, it will be the responsibility of Project Manager or designee to make appropriate notifications. Specific notification requirements and procedures are described below. Emergency response contacts are included
in the table below.

Appendix E Table 1 Emergency Contact Information

Agency	Telephone Number
Currant Volunteer Fire Department	775.863.0444 or 911
Nye County Sheriff	775.553.2345
Currant Ambulance Service	775.863.0213 or 911
Nevada Division of Emergency Management	775.687.4240 (Day) 775.687.5300 (Night)
National Response Center	800.424.8802

Agency	Telephone Number
NDEP, Bureau of Corrective Actions	775.687.9485
NDEP, Emergency Response Hotline	888.331.6337
Nevada Highway Patrol	775.482.6330
Hospital (Ely)	775. 289.3001
NDEP Bureau of Mining Regulation and Reclamation (BMRR)	775.687.9404
Bureau of Land Management, Tonopah Field Office (BLM)	775.482.7800

2.7. Nevada Division of Environmental Protection

The Project consists of mineral exploration activities, and therefore, petroleum products will be the primary contaminant present on site. Releases of petroleum products equal to or exceeding 25 gallons must be reported to NDEP.

Notifications to NDEP of releases described above must be made verbally no later than 5:00 P.M. of the next regular working day from the time that the release was discovered. NDEP notification will include the following information:

1. Name and telephone number of person calling;
2. Name, address, and telephone number of owner or operator;
3. Name, address, and telephone number of facility;
4. Date, time, and type of incident, condition, or circumstance;
5. Type and quantity of material(s) involved;
6. Extent of human or animal mortalities or injuries;
7. Assessment of actual or potential hazards to public health and the environment beyond the facility boundary; and
8. Estimated quantity and disposition of recovered material from the clean-up.

A written summary will be provided to NDEP within ten days following oral notification of the release. The written summary will include the following information:

- Description of the release and its cause;
- Date, time, and duration of the release;
- Whether the condition that caused the release has been remedied, and, if not, the
- anticipated time that the release may be expected to continue; and
- Steps taken or planned to reduce, eliminate, and prevent recurrence of the event.

2.8. State Emergency Response Commission and Local Emergency Planning Committee

Pursuant to the regulations promulgated in the Community Right to Know Act of 1986 (40 CFR Part 355), releases of reportable quantities of hazardous substances, beyond the facility boundary, that may potentially result in exposure to individuals outside of the facility boundary must be reported to the State Emergency Response Commission and Local Emergency Planning Committee.

It is the responsibility of the operator (Major Oil) or designee to determine if there has been a release of a reportable quantity of hazardous material beyond the facility boundary and to make the required notifications. Notification to the State should include the following information:

1. Name, address, and telephone number of the owner or operator of the facility;
2. Name, address, and telephone number of the facility;
3. Chemical name and chemical abstract service registry number, if known, of substances released;
4. Hazardous properties and health effects associated with the substances released;
5. Estimate of the quantity released;
6. Time and duration of the release;
7. Media into which the release occurred;
8. Measures undertaken to mitigate the release;
9. Potential impacts to public health and the environment posed by the release;
10. Name and phone number of person to be contacted for further information regarding the release;
11. Nature and extent of any damage or injuries; and
12. Name and telephone number of any other agencies contacted.

A written follow-up notice will be submitted as soon as possible to update the information provided in the oral notice, to detail actions taken to contain the release and to set forth any known or anticipated acute or chronic health risks and the medical attention or actions to be taken.

2.9. Emergency Equipment

The following emergency equipment and supplies will be available for response to environmental emergencies:

1. Earthmoving equipment;
2. First-aid and medical treatment supplies;
3. Fire extinguisher;
4. Brooms and shovels;
5. Absorbent materials;
6. Personal protective equipment including gloves, boots, goggles, self-contained breathing apparatus, respirators with appropriate cartridges and hydrogen cyanide detectors; and
7. Portable electric pumps and generators.

Emergency equipment is inspected and maintained on a regular basis. SDSs for all the chemicals used at the site are available from the Contractor, Project Geologist, or designee.

Safety Data Sheets

Note: The following are sample SDS for products associated with oilfield drilling, they may or may not be used at the Major Oil Eblana 9 site, though products similar to these are expected to be used.

HALLIBURTON

SAFETY DATA SHEET

Product Trade Name: **QUIK-GEL®**

Revision Date: 14-Aug-2017 **Revision Number:** 20

1. Identification

1.1. Product Identifier

Product Trade Name: QUIK-GEL®
Synonyms None
Chemical Family: Mineral
Internal ID Code HM003747

1.2 Recommended use and restrictions on use

Application: Viscosifier
Uses advised against No information available

1.3 Manufacturer's Name and Contact Details

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton Energy Services, Inc.
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000

Halliburton Energy Services, Inc.
645 - 7th Ave SW Suite 1800
Calgary, AB
T2P 4G8
Canada

Prepared By Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

1.4. Emergency telephone number:

Emergency Telephone Number 1-866-519-4752 or 1-760-476-3962
Global Incident Response Access Code: 334305
Contract Number: 14012

2. Hazards Identification

2.1 Classification in accordance with paragraph (d) of §1910.1200

Carcinogenicity	Category 1A - H350
Specific Target Organ Toxicity - (Repeated Exposure)	Category 1 - H372

2.2. Label Elements

Hazard Pictograms

Signal Word: Danger

Hazard Statements
H350 - May cause cancer by inhalation
H372 - Causes damage to organs through prolonged or repeated exposure if inhaled

Precautionary Statements

Prevention
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P280 - Wear protective gloves/protective clothing/eye protection/face protection

Response
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical attention/advice if you feel unwell

Storage
P405 - Store locked up

Disposal
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations

2.3 Hazards not otherwise classified

This product contains Wyoming bentonite or other sorptive clays. Crystalline silica forms found in this particular clay are limited to quartz. Extreme temperatures that can generate cristobalite or tridymite are not expected to occur under realistic conditions. In addition, all quartz found in sorptive clays are considered “occluded”, i.e., strongly coated with an amorphous silica surface. Occluded quartz has been experimentally-determined to be relatively non-toxic compared to unoccluded quartz. A lack of health effects found in several studies examining occupational exposure to sorptive clays also suggest that chronic inhalation of sorptive clays is not expected to result in silicosis or cancer. In light of these findings OSHA has recently exempted Wyoming bentonite and other sorptive clays from the crystalline silica PEL in §1910.1053(a)(1)(iii).

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - US
Crystalline silica, quartz	14808-60-7	1 - 5%	Carc. 1A (H350) STOT RE 1 (H372)

The exact percentage (concentration) of the composition has been withheld as proprietary.

4. First Aid Measures

4.1. Description of first aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Skin Wash with soap and water. Get medical attention if irritation persists.

Ingestion Rinse mouth with water many times.

4.2 Most important symptoms/effects, acute and delayed

Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

Suitable Extinguishing Media

All standard fire fighting media

Extinguishing media which must not be used for safety reasons

None known.

5.2 Specific hazards arising from the substance or mixture

Special exposure hazards in a fire

None anticipated

5.3 Special protective equipment and precautions for fire-fighters

Special protective equipment for firefighters

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use appropriate protective equipment. Avoid creating and breathing dust. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing.

See Section 8 for additional information

6.2. Environmental precautions

Prevent from entering sewers, waterways, or low areas.

6.3. Methods and material for containment and cleaning up

Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. Handling and storage

7.1. Precautions for safe handling

Handling Precautions

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet. Use appropriate protective equipment.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Information

Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Keep from excessive heat. Do not reuse empty container. Product has a shelf life of 36 months.

8. Exposure Controls/Personal Protection

8.1 Occupational Exposure Limits

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Crystalline silica, quartz	14808-60-7	TWA: 50 µg/m³	TWA: 0.025 mg/m³

Exposures to crystalline silica that result from bentonite or other sorptive clays are exempt from the PEL in §1910.1053. The PEL in §1910.1000 Table Z–3 (i.e., the formula that is approximately equivalent to 100 µg/m³) applies to occupational exposures to respirable crystalline silica from sorptive clays.

8.2 Appropriate engineering controls

Engineering Controls Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits.

8.3 Individual protection measures, such as personal protective equipment

Personal Protective Equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)

Hand Protection Normal work gloves.

Skin Protection Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State: Powder
Color Various
Odor: Mild earthy
Odor Threshold: No information available

Property	Values	Remarks/ - Method
pH:	8-10	
Freezing Point / Range	No data available	
Melting Point / Range	No data available	
Boiling Point / Range	No data available	
Flash Point	No data available	
Flammability (solid, gas)	No data available	
Upper flammability limit	No data available	
Lower flammability limit	No data available	
Evaporation rate	No data available	
Vapor Pressure	No data available	
Vapor Density	No data available	
Specific Gravity	2.6	
Water Solubility	Partly soluble	
Solubility in other solvents	No data available	
Partition coefficient: n-octanol/water	No data available	
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	
Viscosity	No data available	
Explosive Properties	No information available	
Oxidizing Properties	No information available	

9.2. Other information

VOC Content (%) No data available

10. Stability and Reactivity

10.1. Reactivity
Not expected to be reactive.

10.2. Chemical stability
Stable

10.3. Possibility of hazardous reactions
Will Not Occur

10.4. Conditions to avoid
None anticipated

10.5. Incompatible materials
Hydrofluoric acid.

10.6. Hazardous decomposition products
Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).

11. Toxicological Information

11.1 Information on likely routes of exposure

Principle Route of Exposure Eye or skin contact, inhalation.

11.2 Symptoms related to the physical, chemical and toxicological characteristics

Acute Toxicity

Inhalation Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Eye Contact May cause mechanical irritation to eye.

Skin Contact None known.

Ingestion None known.

Chronic Effects/Carcinogenicity Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology

Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2). There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

This product contains Wyoming bentonite or other sorptive clays. Crystalline silica forms found in this particular clay are limited to quartz. Extreme temperatures that can generate cristobalite or tridymite are not expected to occur under realistic conditions. In addition, all quartz found in sorptive clays are considered “occluded”, i.e., strongly coated with an amorphous silica surface (Wendlandt et al., 2007; Hochella and Muryama, 2010; SMI, 2014). Occluded quartz has been experimentally-determined to be relatively non-toxic compared to unoccluded quartz (Geh et al., 2006; Creutzenberg et al., 2008). A lack of health effects found in several studies examining occupational exposure to sorptive clays also suggest that chronic inhalation of sorptive clays is not expected to result in silicosis or cancer (Waxweiler et al., 1988; ACGIH, 1991; USEPA, 1996; IARC, 2005). In light of these findings OSHA has recently exempted Wyoming bentonite and other sorptive clays from the crystalline silica PEL in §1910.1053(a)(1)(iii).

11.3 Toxicity data

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica, quartz	14808-60-7	> 15000 mg/kg (human)	No data available	No data available

Substances	CAS Number	Skin corrosion/irritation
Crystalline silica, quartz	14808-60-7	Non-irritating to the skin

Substances	CAS Number	Serious eye damage/irritation
Crystalline silica, quartz	14808-60-7	Non-irritating to the eye

Substances	CAS Number	Skin Sensitization
Crystalline silica, quartz	14808-60-7	No information available.

Substances	CAS Number	Respiratory Sensitization
Crystalline silica, quartz	14808-60-7	No information available

Substances	CAS Number	Mutagenic Effects
Crystalline silica, quartz	14808-60-7	Not regarded as mutagenic.

Substances	CAS Number	Carcinogenic Effects
Crystalline silica, quartz	14808-60-7	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure.

Substances	CAS Number	Reproductive toxicity
Crystalline silica, quartz	14808-60-7	No information available

Substances	CAS Number	STOT - single exposure
Crystalline silica, quartz	14808-60-7	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	STOT - repeated exposure
Crystalline silica, quartz	14808-60-7	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)

Substances	CAS Number	Aspiration hazard
Crystalline silica, quartz	14808-60-7	Not applicable

12. Ecological Information

12.1. Toxicity

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Crystalline silica, quartz	14808-60-7	EC50 (72 h) =440 mg/L (Selenastrum capricornutum)(similar substance)	LL0 (96 h) =10000 mg/L (Danio rerio)(similar substance)	No information available	LL50 (24 h) >10000 mg/L (Daphnia magna)(similar substance)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Crystalline silica, quartz	14808-60-7	The methods for determining biodegradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Crystalline silica, quartz	14808-60-7	No information available

12.4. Mobility in soil

Substances	CAS Number	Mobility
Crystalline silica, quartz	14808-60-7	No information available

12.5 Other adverse effects

No information available

13. Disposal Considerations

13.1. Waste treatment methods

Disposal methods If practical, recover and reclaim, recycle, or reuse by the guidelines of an approved local reuse program. Should contaminated product become a waste, dispose of in a licensed industrial landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. Transport Information

US DOT

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Canadian TDG

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IMDG/IMO

UN Number	Not restricted
UN proper shipping name:	Not restricted
Transport Hazard Class(es):	Not applicable
Packing Group:	Not applicable
Environmental Hazards:	Not applicable

IATA/ICAO

UN Number	Not restricted
UN proper shipping name:	Not restricted
Transport Hazard Class(es):	Not applicable
Packing Group:	Not applicable
Environmental Hazards:	Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable
Special Precautions for User None

15. Regulatory Information

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

TSCA Significant New Use Rules - S5A2

Substances	CAS Number	TSCA Significant New Use Rules - S5A2
Crystalline silica, quartz	14808-60-7	Not applicable

EPA SARA Title III Extremely Hazardous Substances

Substances	CAS Number	EPA SARA Title III Extremely Hazardous Substances
Crystalline silica, quartz	14808-60-7	Not applicable

EPA SARA (311,312) Hazard Class
Chronic Health Hazard

EPA SARA (313) Chemicals

Substances	CAS Number	Toxic Release Inventory (TRI) - Group I	Toxic Release Inventory (TRI) - Group II
Crystalline silica, quartz	14808-60-7	Not applicable	Not applicable

EPA CERCLA/Superfund Reportable Spill Quantity

Substances	CAS Number	CERCLA RQ
Crystalline silica, quartz	14808-60-7	Not applicable

EPA RCRA Hazardous Waste Classification
If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65

Substances	CAS Number	California Proposition 65
Crystalline silica, quartz	14808-60-7	carcinogen

U.S. State Right-to-Know Regulations

Substances	CAS Number	MA Right-to-Know Law	NJ Right-to-Know Law	PA Right-to-Know Law
Crystalline silica, quartz	14808-60-7	Carcinogen Extraordinarily hazardous	1660	Present

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0*, Flammability 0, Physical Hazard 0 , PPE: E

Canadian Regulations

Canadian Domestic Substances List (DSL) All components listed on inventory or are exempt.

16. Other information

Preparation Information

Prepared By
Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

Revision Date: 14-Aug-2017

Reason for Revision
SDS sections updated:
2
8
11

Additional information
For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key or legend to abbreviations and acronyms used in the safety data sheet
bw – body weight
CAS – Chemical Abstracts Service
d - day
EC50 – Effective Concentration 50%
ErC50 – Effective Concentration growth rate 50%
h - hour
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
mg/m^3 - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PEL – Permissible Exposure Limit
ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
UN – United Nations
w/w - weight/weight

Key literature references and sources for data
www.ChemADVISOR.com/

Disclaimer Statement
This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The

information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

End of Safety Data Sheet

HALLIBURTON

SAFETY DATA SHEET

Product Trade Name: **SODA ASH**

Revision Date: 24-Apr-2017 **Revision Number:** 42

1. Identification

1.1. Product Identifier

Product Trade Name: SODA ASH
Synonyms None
Chemical Family: Carbonate
Internal ID Code HM001822

1.2 Recommended use and restrictions on use

Application: Buffer
Uses advised against No information available

1.3 Manufacturer's Name and Contact Details

Manufacturer/Supplier

Halliburton Energy Services, Inc.
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Telephone: 1-281-871-6107

Halliburton Energy Services, Inc.
645 - 7th Ave SW Suite 1800
Calgary, AB
T2P 4G8
Canada

Prepared By Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

1.4. Emergency telephone number

Emergency Telephone Number: 1-866-519-4752 or 1-760-476-3962
Global Incident Response Access Code: 334305
Contract Number: 14012

2. Hazards Identification

2.1 Classification in accordance with paragraph (d) of §1910.1200

Serious Eye Damage/Irritation	Category 2 - H319

2.2. Label Elements

Hazard Pictograms

Signal Word: Warning

Hazard Statements H319 - Causes serious eye irritation

Precautionary Statements

Prevention P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear eye protection/face protection

Response P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/attention

Storage None

Disposal None

2.3 Hazards not otherwise classified

None known

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - US
Sodium carbonate	497-19-8	60 - 100%	Eye Irrit. 2 (H319)

The exact percentage (concentration) of the composition has been withheld as proprietary.

4. First Aid Measures

4.1. Description of first aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Skin Wash with soap and water. Get medical attention if irritation persists.

Ingestion Do NOT induce vomiting. Give nothing by mouth. Obtain immediate medical attention.

4.2 Most important symptoms/effects, acute and delayed

Causes eye irritation

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

Suitable Extinguishing Media

Water fog, carbon dioxide, foam, dry chemical.

Extinguishing media which must not be used for safety reasons

None known.

5.2 Specific hazards arising from the substance or mixture

Special exposure hazards in a fire
Decomposition in fire may produce harmful gases.

5.3 Special protective equipment and precautions for fire-fighters

Special protective equipment for firefighters
Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use appropriate protective equipment. Avoid creating and breathing dust. Avoid contact with skin, eyes and clothing. Ensure adequate ventilation.
See Section 8 for additional information

6.2. Environmental precautions

Prevent from entering sewers, waterways, or low areas.

6.3. Methods and material for containment and cleaning up

Scoop up and remove.

7. Handling and storage

7.1. Precautions for safe handling

Handling Precautions
Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Ensure adequate ventilation. Wash hands after use. Launder contaminated clothing before reuse. Use appropriate protective equipment.
Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Information
Store away from acids. Store in a cool, dry location. Product has a shelf life of 60 months.

8. Exposure Controls/Personal Protection

8.1 Occupational Exposure Limits

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Sodium carbonate	497-19-8	Not applicable	Not applicable

8.2 Appropriate engineering controls

Engineering Controls Use in a well ventilated area. Localized ventilation should be used to control dust levels.

8.3 Individual protection measures, such as personal protective equipment

Personal Protective Equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, AS/NZS 1715:2009, or equivalent respirator when using this product. Selection of and instruction on using all personal protective

equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Hand Protection	Normal work gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Dust proof goggles.
Other Precautions	None known.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State:	Powder	**Color**	White
Odor:	Odorless	**Odor Threshold:**	No information available

Property Remarks/ - Method	Values
pH:	11.5
Freezing Point / Range	No data available
Melting Point / Range	851 °C
Boiling Point / Range	No data available
Flash Point	No data available
Flammability (solid, gas)	No data available
Upper flammability limit	No data available
Lower flammability limit	No data available
Evaporation rate	No data available
Vapor Pressure	No data available
Vapor Density	No data available
Specific Gravity	2.5
Water Solubility	Partly soluble
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	No data available
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

Molecular Weight	105.99 g/mole
VOC Content (%)	No data available

10. Stability and Reactivity

10.1. Reactivity
Not expected to be reactive.

10.2. Chemical stability
Stable

10.3. Possibility of hazardous reactions
Will Not Occur

10.4. Conditions to avoid
None anticipated

10.5. Incompatible materials

Strong acids.

10.6. Hazardous decomposition products

Carbon monoxide and carbon dioxide.

11. Toxicological Information

11.1 Information on likely routes of exposure

Principle Route of Exposure Eye or skin contact, inhalation.

11.2 Symptoms related to the physical, chemical and toxicological characteristics

Acute Toxicity

Inhalation May cause mild respiratory irritation.

Eye Contact Causes eye irritation.

Skin Contact Not irritating to skin in rabbits.

Ingestion Irritation of the mouth, throat, and stomach.

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 0.1% are chronic health hazards.

11.3 Toxicity data

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium carbonate	497-19-8	4090 mg/kg (Rat) 2800 mg/kg (Rat)	2210 mg/kg (Mouse) > 2000 mg/kg (Rabbit)	2.3 mg/L (Rat) 2h

Substances	CAS Number	Skin corrosion/irritation
Sodium carbonate	497-19-8	Non-irritating to the skin

Substances	CAS Number	Serious eye damage/irritation
Sodium carbonate	497-19-8	Irritating to eyes

Substances	CAS Number	Skin Sensitization
Sodium carbonate	497-19-8	Not classified

Substances	CAS Number	Respiratory Sensitization
Sodium carbonate	497-19-8	No information available

Substances	CAS Number	Mutagenic Effects
Sodium carbonate	497-19-8	In vivo tests did not show mutagenic effects.

Substances	CAS Number	Carcinogenic Effects
Sodium carbonate	497-19-8	No information available

Substances	CAS Number	Reproductive toxicity
Sodium carbonate	497-19-8	Did not show teratogenic effects in animal experiments.

Substances	CAS Number	STOT - single exposure
Sodium carbonate	497-19-8	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	STOT - repeated exposure
Sodium carbonate	497-19-8	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	Aspiration hazard
Sodium carbonate	497-19-8	Not applicable

12. Ecological Information

12.1. Toxicity

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Sodium carbonate	497-19-8	EC50 242 mg/L (Nitzschia)	TLM24 385 mg/L (Lepomis macrochirus) LC50 310-1220 mg/L (Pimephales promelas) LC50 (96h) 300 mg/L (Lepomis macrochirus)	No information available	EC50 265 mg/L (Daphnia magna) EC50 (48h) 200 – 227 mg/L (Ceriodaphnia sp.)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Sodium carbonate	497-19-8	The methods for determining biodegradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Sodium carbonate	497-19-8	No information available

12.4. Mobility in soil

Substances	CAS Number	Mobility
Sodium carbonate	497-19-8	No information available

12.5 Other adverse effects

No information available

13. Disposal Considerations

13.1. Waste treatment methods

Disposal methods Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging Follow all applicable national or local regulations.

14. Transport Information

US DOT

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Canadian TDG

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IMDG/IMO

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable

Packing Group: Not applicable
Environmental Hazards: Not applicable

IATA/ICAO

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable
Special Precautions for User None

15. Regulatory Information

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

TSCA Significant New Use Rules - S5A2

Substances	CAS Number	TSCA Significant New Use Rules - S5A2
Sodium carbonate	497-19-8	Not applicable

EPA SARA Title III Extremely Hazardous Substances

Substances	CAS Number	EPA SARA Title III Extremely Hazardous Substances
Sodium carbonate	497-19-8	Not applicable

EPA SARA (311,312) Hazard Class
Acute Health Hazard

EPA SARA (313) Chemicals

Substances	CAS Number	Toxic Release Inventory (TRI) - Group I	Toxic Release Inventory (TRI) - Group II
Sodium carbonate	497-19-8	Not applicable	Not applicable

EPA CERCLA/Superfund Reportable Spill Quantity

Substances	CAS Number	CERCLA RQ
Sodium carbonate	497-19-8	Not applicable

EPA RCRA Hazardous Waste Classification
If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65

Substances	CAS Number	California Proposition 65
Sodium carbonate	497-19-8	Not applicable

U.S. State Right-to-Know Regulations

Substances	CAS Number	MA Right-to-Know Law	NJ Right-to-Know Law	PA Right-to-Know Law
Sodium carbonate	497-19-8	Not applicable	Not applicable	Not applicable

NFPA Ratings: Health 2, Flammability 0, Reactivity 0
HMIS Ratings: Health 2, Flammability 0, Physical Hazard 0 , PPE: B

Canadian Regulations

Canadian Domestic Substances List (DSL) All components listed on inventory or are exempt.

16. Other information

Preparation Information

Prepared By
Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

Revision Date: 24-Apr-2017

Reason for Revision SDS sections updated:
2

Additional information
For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key or legend to abbreviations and acronyms used in the safety data sheet
bw – body weight
CAS – Chemical Abstracts Service
d - day
EC50 – Effective Concentration 50%
ErC50 – Effective Concentration growth rate 50%
h - hour
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
mg/m^3 - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PEL – Permissible Exposure Limit
ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
UN – United Nations
w/w - weight/weight

Key literature references and sources for data
www.ChemADVISOR.com/

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End of Safety Data Sheet

HALLIBURTON

SAFETY DATA SHEET

Product Trade Name: **EZ-MUD®**

Revision Date: 11-Apr-2017 **Revision Number:** 37

1. Identification

1.1. Product Identifier

Product Trade Name: EZ-MUD®
Synonyms None
Chemical Family: Blend
Internal ID Code HM003643

1.2 Recommended use and restrictions on use

Application: Shale Inhibitor
Uses advised against No information available

1.3 Manufacturer's Name and Contact Details

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251

Halliburton Energy Services
645 - 7th Ave SW Suite 1800
Calgary, AB
T2P 4G8
Canada

Prepared By Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

1.4. Emergency telephone number

Emergency Telephone Number: 1-866-519-4752 or 1-760-476-3962
Global Incident Response Access Code: 334305
Contract Number: 14012

2. Hazards Identification

2.1 Classification in accordance with paragraph (d) of §1910.1200

As adopted by the competent authority, this product does not require an SDS or hazard warning label.

Not classified

2.2. Label Elements

Hazard Pictograms

Signal Word: Not Classified

Hazard Statements Not Hazardous

Precautionary Statements

Prevention	None
Response	None
Storage	None
Disposal	None

2.3 Hazards not otherwise classified

None known

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - US
Hydrotreated light petroleum distillate	64742-47-8	10 - 30%	Asp. Tox. 1 (H304)
Ethoxylated alcohol	Proprietary	1 - 5%	Acute Tox. 4 (H302) Skin Irrit. 2 (H315) Eye Corr. 1 (H318) Aquatic Acute 2 (H401) Aquatic Chronic 3 (H412)

The exact percentage (concentration) of the composition has been withheld as proprietary.

4. First Aid Measures

4.1. Description of first aid measures

Inhalation	If inhaled, move victim to fresh air and seek medical attention.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Skin	Wash with soap and water. Get medical attention if irritation persists. Remove contaminated shoes and discard.
Ingestion	Do NOT induce vomiting. Give nothing by mouth. Obtain immediate medical attention.

4.2 Most important symptoms/effects, acute and delayed

No significant hazards expected.

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

Suitable Extinguishing Media

Water fog, carbon dioxide, foam, dry chemical.

Extinguishing media which must not be used for safety reasons

None known.

5.2 Specific hazards arising from the substance or mixture

Special exposure hazards in a fire

Decomposition in fire may produce harmful gases. Use water spray to cool fire exposed surfaces.

5.3 Special protective equipment and precautions for fire-fighters

Special protective equipment for firefighters

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use appropriate protective equipment. Avoid contact with skin, eyes and clothing. Avoid breathing vapors. Ensure adequate ventilation.
See Section 8 for additional information

6.2. Environmental precautions

Prevent from entering sewers, waterways, or low areas.

6.3. Methods and material for containment and cleaning up

Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. Handling and storage

7.1. Precautions for safe handling

Handling Precautions

Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Ensure adequate ventilation. Wash hands after use. Launder contaminated clothing before reuse. Use appropriate protective equipment.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Information

Store away from oxidizers. Keep container closed when not in use. Store locked up. Product has a shelf life of 12 months.

8. Exposure Controls/Personal Protection

8.1 Occupational Exposure Limits

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Hydrotreated light petroleum distillate	64742-47-8	Not applicable	Not applicable
Ethoxylated alcohol	Proprietary	Not applicable	Not applicable

8.2 Appropriate engineering controls

Engineering Controls A well ventilated area to control dust levels. Local exhaust ventilation should be used in areas without good cross ventilation.

8.3 Individual protection measures, such as personal protective equipment

Personal Protective Equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, AS/NZS 1715:2009, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.
Organic vapor respirator with a dust/mist filter. (A2P2/P3) In high concentrations, supplied air respirator or a self-contained breathing apparatus.

Hand Protection Chemical-resistant protective gloves (EN 374) Suitable materials for longer, direct contact (recommended: protection index 6, corresponding to > 480 minutes

	permeation time as per EN 374): Nitrile gloves. (>= 0.35 mm thickness) This information is based on literature references and on information provided by glove manufacturers, or is derived by analogy with similar substances. Please note that in practice the working life of chemical-resistant protective gloves may be considerably shorter than the permeation time determined in accordance with EN 374 as a result of the many influencing factors (e.g. temperature). If signs of wear and tear are noticed then the gloves should be replaced. Manufacturer's directions for use should be observed because of great diversity of types.
Skin Protection	Rubber apron.
Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	None known.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State:	Liquid	**Color**	White to gray
Odor:	Mild hydrocarbon	**Odor Threshold:**	No information available

Property Remarks/ - Method	Values
pH:	6-8
Freezing Point / Range	No data available
Melting Point / Range	No data available
Boiling Point / Range	175 °C / 347 °F
Flash Point	> 93 °C / > 200 °F PMCC
Flammability (solid, gas)	No data available
Upper flammability limit	No data available
Lower flammability limit	No data available
Evaporation rate	< 1
Vapor Pressure	0.002 mmHg
Vapor Density	No data available
Specific Gravity	1
Water Solubility	Partly soluble
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	> 200 °C / 392 °F
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

VOC Content (%)	No data available

10. Stability and Reactivity

10.1. Reactivity

Not expected to be reactive.

10.2. Chemical stability

Stable

10.3. Possibility of hazardous reactions

Will Not Occur

10.4. Conditions to avoid

Keep away from heat, sparks and flame.

10.5. Incompatible materials
Strong oxidizers.

10.6. Hazardous decomposition products
Ammonia. Oxides of nitrogen. Carbon monoxide and carbon dioxide.

11. Toxicological Information

11.1 Information on likely routes of exposure
Principle Route of Exposure Eye or skin contact, inhalation.

11.2 Symptoms related to the physical, chemical and toxicological characteristics
Acute Toxicity

Inhalation May cause mild respiratory irritation.
Eye Contact In vitro tests indicate that the product is not an eye irritant.
Skin Contact Causes mild skin irritation.
Ingestion May cause mild gastric distress.

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 0.1% are chronic health hazards.

11.3 Toxicity data

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Hydrotreated light petroleum distillate	64742-47-8	>5000 mg/kg-bw (rat) (similar substance)	>2000 mg/kg-bw (rabbit) (similar substance)	>5.2 mg/L (rat, 4 h, vapor) (similar substance)
Ethoxylated alcohol	Proprietary	1600 mg/kg-bw (rat) (similar substance)	>2000 mg/kg-bw (rabbit) (similar substance)	>0.22 mg/L (rat, 4h, aerosol, saturated) (similar substance)

Substances	CAS Number	Skin corrosion/irritation
Hydrotreated light petroleum distillate	64742-47-8	Non-irritating to the skin (similar substances)
Ethoxylated alcohol		Causes moderate skin irritation. (Rabbit) (similar substances) Skin, rabbit:

Substances	CAS Number	Serious eye damage/irritation
Hydrotreated light petroleum distillate	64742-47-8	Non-irritating to rabbit's eye (similar substances)
Ethoxylated alcohol		Causes severe eye irritation which may damage tissue. (Rabbit) (similar substances) Eye, rabbit:

Substances	CAS Number	Skin Sensitization
Hydrotreated light petroleum distillate	64742-47-8	Did not cause sensitization on laboratory animals (guinea pig) (similar substances)
Ethoxylated alcohol		Did not cause sensitization on laboratory animals (guinea pig) (similar substances)

Substances	CAS Number	Respiratory Sensitization
Hydrotreated light petroleum distillate	64742-47-8	No information available
Ethoxylated alcohol		No information available

Substances	CAS Number	Mutagenic Effects
Hydrotreated light petroleum distillate	64742-47-8	In vitro tests did not show mutagenic effects. In vivo tests did not show mutagenic effects. (similar substances)
Ethoxylated alcohol		In vitro tests did not show mutagenic effects. In vivo tests did not show mutagenic effects. (similar substances)

Substances	CAS Number	Carcinogenic Effects
Hydrotreated light petroleum	64742-47-8	Did not show carcinogenic effects in animal experiments (similar substances)

distillate		
Ethoxylated alcohol		Did not show carcinogenic or teratogenic effects in animal experiments (similar substances) Did not show carcinogenic effects in animal experiments

Substances	CAS Number	Reproductive toxicity
Hydrotreated light petroleum distillate	64742-47-8	Animal testing did not show any effects on fertility. Did not show teratogenic effects in animal experiments. (similar substances)
Ethoxylated alcohol		Animal testing did not show any effects on fertility. Did not show teratogenic effects in animal experiments. (similar substances)

Substances	CAS Number	STOT - single exposure
Hydrotreated light petroleum distillate	64742-47-8	No significant toxicity observed in animal studies at concentration requiring classification.
Ethoxylated alcohol		No significant toxicity observed in animal studies at concentration requiring classification. (similar substances)

Substances	CAS Number	STOT - repeated exposure
Hydrotreated light petroleum distillate	64742-47-8	No significant toxicity observed in animal studies at concentration requiring classification. (similar substances)
Ethoxylated alcohol		No significant toxicity observed in animal studies at concentration requiring classification. (similar substances)

Substances	CAS Number	Aspiration hazard
Hydrotreated light petroleum distillate	64742-47-8	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.
Ethoxylated alcohol		Not applicable

12. Ecological Information

12.1. Toxicity

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Hydrotreated light petroleum distillate	64742-47-8	ErL50(72 h)>10000 mg/L (Skeletonema costatum)	LC50(96 h)>10000 mg/L (Scophthalmus maximus) NOELC(28 d)>1000 mg/L (fish)	No information available	LC50(48 h)>10000 mg/L (Acartia tonsa) NOEC(21 d)=1000 mg/L (Daphnia magna)
Ethoxylated alcohol	Proprietary	IC50(72 h)=1-10 mg/L (Desmodesmus subspicatus)	LC50(96 h)=1-10 mg/L (Cyprinus carpio)	No information available	EC50(48 h)=1-10 mg/L (Daphnia magna) EC50(21 d)=0.37 mg/L (Daphnia magna)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Hydrotreated light petroleum distillate	64742-47-8	Readily biodegradable (68.1% @ 28d)
Ethoxylated alcohol	Proprietary	Readily biodegradable (85% @ 28d)

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Hydrotreated light petroleum distillate	64742-47-8	Not Applicable
Ethoxylated alcohol	Proprietary	Log Pow=2.2

12.4. Mobility in soil

Substances	CAS Number	Mobility
Hydrotreated light petroleum distillate	64742-47-8	No information available
Ethoxylated alcohol	Proprietary	Kd = 3.07 L/kg Kd = 3.09 L/kg

12.5 Other adverse effects

No information available

13. Disposal Considerations

13.1. Waste treatment methods

Disposal methods Disposal should be made in accordance with federal, state, and local regulations. Incineration recommended in approved incinerator according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. Transport Information

US DOT

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Canadian TDG

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IMDG/IMO

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IATA/ICAO

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable
Special Precautions for User None

15. Regulatory Information

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

TSCA Significant New Use Rules - S5A2

Substances	CAS Number	TSCA Significant New Use Rules - S5A2
Hydrotreated light petroleum distillate	64742-47-8	Not applicable
Ethoxylated alcohol	Proprietary	Not applicable

EPA SARA Title III Extremely Hazardous Substances

Substances	CAS Number	EPA SARA Title III Extremely Hazardous Substances
Hydrotreated light petroleum distillate	64742-47-8	Not applicable
Ethoxylated alcohol	Proprietary	Not applicable

EPA SARA (311,312) Hazard Class
None

EPA SARA (313) Chemicals

Substances	CAS Number	Toxic Release Inventory (TRI) - Group I	Toxic Release Inventory (TRI) - Group II
Hydrotreated light petroleum distillate	64742-47-8	Not applicable	Not applicable
Ethoxylated alcohol	Proprietary	Not applicable	Not applicable

EPA CERCLA/Superfund Reportable Spill Quantity

Substances	CAS Number	CERCLA RQ
Hydrotreated light petroleum distillate	64742-47-8	Not applicable
Ethoxylated alcohol	Proprietary	Not applicable

EPA RCRA Hazardous Waste Classification
If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65

Substances	CAS Number	California Proposition 65
Hydrotreated light petroleum distillate	64742-47-8	Not applicable
Ethoxylated alcohol	Proprietary	Not applicable

U.S. State Right-to-Know Regulations

Substances	CAS Number	MA Right-to-Know Law	NJ Right-to-Know Law	PA Right-to-Know Law
Hydrotreated light petroleum distillate	64742-47-8	Not applicable	Not applicable	Not applicable
Ethoxylated alcohol	Proprietary	Not applicable	Not applicable	Not applicable

NFPA Ratings: Health 2, Flammability 1, Reactivity 0
HMIS Ratings: Health 2, Flammability 1, Physical Hazard 0 , PPE: B

Canadian Regulations

Canadian Domestic Substances List (DSL) All components listed on inventory or are exempt.

16. Other information

Preparation Information

Prepared By
Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

Revision Date: 11-Apr-2017

Reason for Revision SDS sections updated:
2
4
11

Additional information
For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at

1-580-251-4335.

Key or legend to abbreviations and acronyms used in the safety data sheet
bw – body weight
CAS – Chemical Abstracts Service
d - day
EC50 – Effective Concentration 50%
ErC50 – Effective Concentration growth rate 50%
h - hour
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
mg/m^3 - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PEL – Permissible Exposure Limit
ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
UN – United Nations
w/w - weight/weight

Key literature references and sources for data
www.ChemADVISOR.com/
NZ CCID

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End of Safety Data Sheet

HALLIBURTON

SAFETY DATA SHEET

Product Trade Name: **BAROID®**

Revision Date: 06-Jan-2016 **Revision Number:** 13

1. Identification

1.1. Product Identifier

Product Trade Name: BAROID®
Synonyms: None
Chemical Family: Mineral
Internal ID Code HM003542

1.2 Recommended use and restrictions on use

Application: Weight Additive
Uses Advised Against No information available

1.3 Manufacturer's Name and Contact Details

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 575-5000
Emergency Telephone: 1-866-519-4752 (US, Canada, Mexico) or 1-760-476-3962

Halliburton Energy Services
645 - 7th Ave SW Suite 2200
Calgary, AB
T2P 4G8
Canada

Prepared By Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

1.4. Emergency telephone number

Emergency Telephone Number 1-866-519-4752 or 1-760-476-3962

2. Hazard(s) Identification

2.1 Classification in accordance with paragraph (d) of §1910.1200

Carcinogenicity	Category 1A - H350
Specific Target Organ Toxicity - (Repeated Exposure)	Category 2 - H373

2.2. Label Elements

Hazard Pictograms

Signal Word Danger

Hazard Statements
H350 - May cause cancer by inhalation
H373 - May cause damage to organs through prolonged or repeated exposure if inhaled

Precautionary Statements

Prevention
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P260 - Do not breathe dust/fume/gas/mist/vapors/spray

Response
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical attention/advice if you feel unwell

Storage
P405 - Store locked up

Disposal
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations

2.3 Hazards not otherwise classified
None known

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - US
Crystalline silica, quartz	14808-60-7	1 - 5%	Carc. 1A (H350) STOT RE 1 (H372)

The exact percentage (concentration) of the composition has been withheld as proprietary.

4. First-Aid Measures

4.1. Description of first aid measures
Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Skin Wash with soap and water. Get medical attention if irritation persists.

Ingestion Do NOT induce vomiting. Give nothing by mouth. Obtain immediate medical attention.

4.2 Most important symptoms/effects, acute and delayed
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

Suitable Extinguishing Media

All standard fire fighting media

Extinguishing media which must not be used for safety reasons

None known.

5.2 Specific hazards arising from the substance or mixture

Special Exposure Hazards

None anticipated

5.3 Special protective equipment and precautions for fire-fighters

Special Protective Equipment for Fire-Fighters

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use appropriate protective equipment. Avoid creating and breathing dust.
See Section 8 for additional information

6.2. Environmental precautions

Prevent from entering sewers, waterways, or low areas.

6.3. Methods and material for containment and cleaning up

Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. Handling and storage

7.1. Precautions for Safe Handling

Handling Precautions

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Information

Do not reuse empty container. Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use.

8. Exposure Controls/Personal Protection

8.1 Occupational Exposure Limits

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Crystalline silica, quartz	14808-60-7	TWA: 10 mg/m^3 %SiO2 + 2	TWA: 0.025 mg/m^3

8.2 Appropriate engineering controls

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits.

8.3 Individual protection measures, such as personal protective equipment

Personal Protective Equipment	If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149 (FFP2/FFP3), AS/NZS 1715, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State:	Solid	**Color:**	Pink to tan to gray
Odor:	Odorless	**Odor Threshold:**	No information available

Property Remarks/ - Method	Values
pH:	No data available
Freezing Point/Range	No data available
Melting Point/Range	No data available
Boiling Point/Range	No data available
Flash Point	No data available
Flammability (solid, gas)	No data available
upper flammability limit	No data available
lower flammability limit	No data available
Evaporation rate	No data available
Vapor Pressure	No data available
Vapor Density	No data available
Specific Gravity	4.23
Water Solubility	Insoluble in water
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	No data available
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

Molecular Weight	233.4
VOC Content (%)	No data available

10. Stability and Reactivity

10.1. Reactivity

Not expected to be reactive.

10.2. Chemical Stability
Stable

10.3. Possibility of Hazardous Reactions
Will Not Occur

10.4. Conditions to Avoid
None anticipated

10.5. Incompatible Materials
None known.

10.6. Hazardous Decomposition Products
Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).

11. Toxicological Information

11.1 Information on likely routes of exposure
Principle Route of Exposure Eye or skin contact, inhalation.

11.2 Symptoms related to the physical, chemical and toxicological characteristics
Acute Toxicity

Inhalation Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Eye Contact May cause mechanical irritation to eye.
Skin Contact None known.
Ingestion May produce nervous system effects such as feeling of weakness, unsteady walk, and dilation of blood vessels. May affect the heart and cardiovascular system.

Chronic Effects/Carcinogenicity Prolonged inhalation of fine barium sulfate dusts form harmless nodular granules in lung, an affliction called baritosis. Baritosis produces no symptoms of bronchitis or emphysema, and lung functioning is not affected although dyspnea, upon exertion, may occur. The nodulation disappears if exposure is stopped. Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American

Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2). There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

11.3 Toxicity data

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica, quartz	14808-60-7	>15,000 mg/kg (Human)	No data available	No data available

Substances	CAS Number	Skin corrosion/irritation
Crystalline silica, quartz	14808-60-7	Non-irritating to the skin

Substances	CAS Number	Eye damage/irritation
Crystalline silica, quartz	14808-60-7	Mechanical irritation of the eyes is possible.

Substances	CAS Number	Skin Sensitization
Crystalline silica, quartz	14808-60-7	No information available.

Substances	CAS Number	Respiratory Sensitization
Crystalline silica, quartz	14808-60-7	No information available

Substances	CAS Number	Mutagenic Effects
Crystalline silica, quartz	14808-60-7	Not regarded as mutagenic.

Substances	CAS Number	Carcinogenic Effects
Crystalline silica, quartz	14808-60-7	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure. Based on available scientific evidence, this substance is a threshold carcinogen with a mode of action involving indirect genotoxicity secondary to lung injury.

Substances	CAS Number	Reproductive toxicity
Crystalline silica, quartz	14808-60-7	No information available

Substances	CAS Number	STOT - single exposure
Crystalline silica, quartz	14808-60-7	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	STOT - repeated exposure
Crystalline silica, quartz	14808-60-7	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)

Substances	CAS Number	Aspiration hazard
Crystalline silica, quartz	14808-60-7	Not applicable

12. Ecological Information

12.1. Toxicity

Ecotoxicity Effects

Product Ecotoxicity Data

No data available

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates

Crystalline silica, quartz	14808-60-7	No information available	LL0 (96h) 10,000 mg/L (Danio rerio) (similar substance)	No information available	LL50 (24h) > 10,000 mg/L (Daphnia magna) (similar substance)

12.2. Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

Substances	CAS Number	Persistence and Degradability
Crystalline silica, quartz	14808-60-7	The methods for determining biodegradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Crystalline silica, quartz	14808-60-7	No information available

12.4. Mobility in soil

Substances	CAS Number	Mobility
Crystalline silica, quartz	14808-60-7	No information available

12.5 Other adverse effects

No information available

13. Disposal Considerations

13.1. Waste treatment methods

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging Follow all applicable national or local regulations.

14. Transport Information

US DOT

UN Number: Not restricted
UN Proper Shipping Name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

US DOT Bulk

DOT (Bulk) Not applicable

Canadian TDG

UN Number: Not restricted
UN Proper Shipping Name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IMDG/IMO

UN Number: Not restricted
UN Proper Shipping Name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IATA/ICAO

UN Number: Not restricted
UN Proper Shipping Name: Not restricted

Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable
Special Precautions for User: None

15. Regulatory Information

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

TSCA Significant New Use Rules - S5A2

Substances	CAS Number	TSCA Significant New Use Rules - S5A2
Crystalline silica, quartz	14808-60-7	Not applicable

EPA SARA Title III Extremely Hazardous Substances

Substances	CAS Number	EPA SARA Title III Extremely Hazardous Substances
Crystalline silica, quartz	14808-60-7	Not applicable

EPA SARA (311,312) Hazard Class
Chronic Health Hazard

EPA SARA (313) Chemicals

Substances	CAS Number	Toxic Release Inventory (TRI) - Group I	Toxic Release Inventory (TRI) - Group II
Crystalline silica, quartz	14808-60-7	Not applicable	Not applicable

EPA CERCLA/Superfund Reportable Spill Quantity

Substances	CAS Number	CERCLA RQ
Crystalline silica, quartz	14808-60-7	Not applicable

EPA RCRA Hazardous Waste Classification
If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65 The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law One or more components listed.

NJ Right-to-Know Law One or more components listed.

PA Right-to-Know Law One or more components listed.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Health 1*, Flammability 0, Physical Hazard 0 , PPE: E

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt.

16. Other information

Preparation Information
Prepared By Chemical Stewardship
Telephone: 1-281-871-6107

e-mail: fdunexchem@halliburton.com

Revision Date: 06-Jan-2016

Reason for Revision SDS sections updated:
2

Additional information
For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key or legend to abbreviations and acronyms
bw – body weight
CAS – Chemical Abstracts Service
EC50 – Effective Concentration 50%
ErC50 – Effective Concentration growth rate 50%
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PEL – Permissible Exposure Limit
ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
UN – United Nations
h - hour
mg/m^3 - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
w/w - weight/weight
d - day

Key literature references and sources for data
www.ChemADVISOR.com/

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End of Safety Data Sheet

HALLIBURTON

SAFETY DATA SHEET

Product Trade Name: **QUIK-GEL®**

Revision Date: 14-Aug-2017 **Revision Number:** 20

1. Identification

1.1. Product Identifier

Product Trade Name: QUIK-GEL®
Synonyms None
Chemical Family: Mineral
Internal ID Code HM003747

1.2 Recommended use and restrictions on use

Application: Viscosifier
Uses advised against No information available

1.3 Manufacturer's Name and Contact Details

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton Energy Services, Inc.
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000

Halliburton Energy Services, Inc.
645 - 7th Ave SW Suite 1800
Calgary, AB
T2P 4G8
Canada

Prepared By Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

1.4. Emergency telephone number:

Emergency Telephone Number 1-866-519-4752 or 1-760-476-3962
Global Incident Response Access Code: 334305
Contract Number: 14012

2. Hazards Identification

2.1 Classification in accordance with paragraph (d) of §1910.1200

Carcinogenicity	Category 1A - H350
Specific Target Organ Toxicity - (Repeated Exposure)	Category 1 - H372

2.2. Label Elements

Hazard Pictograms

Signal Word: Danger

Hazard Statements
H350 - May cause cancer by inhalation
H372 - Causes damage to organs through prolonged or repeated exposure if inhaled

Precautionary Statements

Prevention
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P280 - Wear protective gloves/protective clothing/eye protection/face protection

Response
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical attention/advice if you feel unwell

Storage
P405 - Store locked up

Disposal
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations

2.3 Hazards not otherwise classified

This product contains Wyoming bentonite or other sorptive clays. Crystalline silica forms found in this particular clay are limited to quartz. Extreme temperatures that can generate cristobalite or tridymite are not expected to occur under realistic conditions. In addition, all quartz found in sorptive clays are considered “occluded”, i.e., strongly coated with an amorphous silica surface. Occluded quartz has been experimentally-determined to be relatively non-toxic compared to unoccluded quartz. A lack of health effects found in several studies examining occupational exposure to sorptive clays also suggest that chronic inhalation of sorptive clays is not expected to result in silicosis or cancer. In light of these findings OSHA has recently exempted Wyoming bentonite and other sorptive clays from the crystalline silica PEL in §1910.1053(a)(1)(iii).

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - US
Crystalline silica, quartz	14808-60-7	1 - 5%	Carc. 1A (H350) STOT RE 1 (H372)

The exact percentage (concentration) of the composition has been withheld as proprietary.

4. First Aid Measures

4.1. Description of first aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Skin Wash with soap and water. Get medical attention if irritation persists.

Ingestion Rinse mouth with water many times.

4.2 Most important symptoms/effects, acute and delayed

Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

Suitable Extinguishing Media

All standard fire fighting media

Extinguishing media which must not be used for safety reasons

None known.

5.2 Specific hazards arising from the substance or mixture

Special exposure hazards in a fire

None anticipated

5.3 Special protective equipment and precautions for fire-fighters

Special protective equipment for firefighters

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use appropriate protective equipment. Avoid creating and breathing dust. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing.

See Section 8 for additional information

6.2. Environmental precautions

Prevent from entering sewers, waterways, or low areas.

6.3. Methods and material for containment and cleaning up

Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. Handling and storage

7.1. Precautions for safe handling

Handling Precautions

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet. Use appropriate protective equipment.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Information

Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Keep from excessive heat. Do not reuse empty container. Product has a shelf life of 36 months.

8. Exposure Controls/Personal Protection

8.1 Occupational Exposure Limits

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Crystalline silica, quartz	14808-60-7	TWA: 50 µg/m³	TWA: 0.025 mg/m³

Exposures to crystalline silica that result from bentonite or other sorptive clays are exempt from the PEL in §1910.1053. The PEL in §1910.1000 Table Z–3 (i.e., the formula that is approximately equivalent to 100 µg/m³) applies to occupational exposures to respirable crystalline silica from sorptive clays.

8.2 Appropriate engineering controls

Engineering Controls Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits.

8.3 Individual protection measures, such as personal protective equipment

Personal Protective Equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)

Hand Protection Normal work gloves.

Skin Protection Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State: Powder
Color Various
Odor: Mild earthy
Odor Threshold: No information available

Property	Values	Remarks/ - Method
pH:	8-10	
Freezing Point / Range	No data available	
Melting Point / Range	No data available	
Boiling Point / Range	No data available	
Flash Point	No data available	
Flammability (solid, gas)	No data available	
Upper flammability limit	No data available	
Lower flammability limit	No data available	
Evaporation rate	No data available	
Vapor Pressure	No data available	
Vapor Density	No data available	
Specific Gravity	2.6	
Water Solubility	Partly soluble	
Solubility in other solvents	No data available	
Partition coefficient: n-octanol/water	No data available	
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	
Viscosity	No data available	
Explosive Properties	No information available	
Oxidizing Properties	No information available	

9.2. Other information

VOC Content (%) No data available

10. Stability and Reactivity

10.1. Reactivity
Not expected to be reactive.

10.2. Chemical stability
Stable

10.3. Possibility of hazardous reactions
Will Not Occur

10.4. Conditions to avoid
None anticipated

10.5. Incompatible materials
Hydrofluoric acid.

10.6. Hazardous decomposition products
Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).

11. Toxicological Information

11.1 Information on likely routes of exposure

Principle Route of Exposure Eye or skin contact, inhalation.

11.2 Symptoms related to the physical, chemical and toxicological characteristics

Acute Toxicity

Inhalation Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Eye Contact May cause mechanical irritation to eye.

Skin Contact None known.

Ingestion None known.

Chronic Effects/Carcinogenicity Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology

Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2). There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

This product contains Wyoming bentonite or other sorptive clays. Crystalline silica forms found in this particular clay are limited to quartz. Extreme temperatures that can generate cristobalite or tridymite are not expected to occur under realistic conditions. In addition, all quartz found in sorptive clays are considered “occluded”, i.e., strongly coated with an amorphous silica surface (Wendlandt et al., 2007; Hochella and Muryama, 2010; SMI, 2014). Occluded quartz has been experimentally-determined to be relatively non-toxic compared to unoccluded quartz (Geh et al., 2006; Creutzenberg et al., 2008). A lack of health effects found in several studies examining occupational exposure to sorptive clays also suggest that chronic inhalation of sorptive clays is not expected to result in silicosis or cancer (Waxweiler et al., 1988; ACGIH, 1991; USEPA, 1996; IARC, 2005). In light of these findings OSHA has recently exempted Wyoming bentonite and other sorptive clays from the crystalline silica PEL in §1910.1053(a)(1)(iii).

11.3 Toxicity data

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica, quartz	14808-60-7	> 15000 mg/kg (human)	No data available	No data available

Substances	CAS Number	Skin corrosion/irritation
Crystalline silica, quartz	14808-60-7	Non-irritating to the skin

Substances	CAS Number	Serious eye damage/irritation
Crystalline silica, quartz	14808-60-7	Non-irritating to the eye

Substances	CAS Number	Skin Sensitization
Crystalline silica, quartz	14808-60-7	No information available.

Substances	CAS Number	Respiratory Sensitization
Crystalline silica, quartz	14808-60-7	No information available

Substances	CAS Number	Mutagenic Effects
Crystalline silica, quartz	14808-60-7	Not regarded as mutagenic.

Substances	CAS Number	Carcinogenic Effects
Crystalline silica, quartz	14808-60-7	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure.

Substances	CAS Number	Reproductive toxicity
Crystalline silica, quartz	14808-60-7	No information available

Substances	CAS Number	STOT - single exposure
Crystalline silica, quartz	14808-60-7	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	STOT - repeated exposure
Crystalline silica, quartz	14808-60-7	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)

Substances	CAS Number	Aspiration hazard
Crystalline silica, quartz	14808-60-7	Not applicable

12. Ecological Information

12.1. Toxicity

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Crystalline silica, quartz	14808-60-7	EC50 (72 h) =440 mg/L (Selenastrum capricornutum)(similar substance)	LL0 (96 h) =10000 mg/L (Danio rerio)(similar substance)	No information available	LL50 (24 h) >10000 mg/L (Daphnia magna)(similar substance)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Crystalline silica, quartz	14808-60-7	The methods for determining biodegradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Crystalline silica, quartz	14808-60-7	No information available

12.4. Mobility in soil

Substances	CAS Number	Mobility
Crystalline silica, quartz	14808-60-7	No information available

12.5 Other adverse effects

No information available

13. Disposal Considerations

13.1. Waste treatment methods

Disposal methods If practical, recover and reclaim, recycle, or reuse by the guidelines of an approved local reuse program. Should contaminated product become a waste, dispose of in a licensed industrial landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. Transport Information

US DOT

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Canadian TDG

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IMDG/IMO

UN Number	Not restricted
UN proper shipping name:	Not restricted
Transport Hazard Class(es):	Not applicable
Packing Group:	Not applicable
Environmental Hazards:	Not applicable

IATA/ICAO

UN Number	Not restricted
UN proper shipping name:	Not restricted
Transport Hazard Class(es):	Not applicable
Packing Group:	Not applicable
Environmental Hazards:	Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable
Special Precautions for User None

15. Regulatory Information

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

TSCA Significant New Use Rules - S5A2

Substances	CAS Number	TSCA Significant New Use Rules - S5A2
Crystalline silica, quartz	14808-60-7	Not applicable

EPA SARA Title III Extremely Hazardous Substances

Substances	CAS Number	EPA SARA Title III Extremely Hazardous Substances
Crystalline silica, quartz	14808-60-7	Not applicable

EPA SARA (311,312) Hazard Class
Chronic Health Hazard

EPA SARA (313) Chemicals

Substances	CAS Number	Toxic Release Inventory (TRI) - Group I	Toxic Release Inventory (TRI) - Group II
Crystalline silica, quartz	14808-60-7	Not applicable	Not applicable

EPA CERCLA/Superfund Reportable Spill Quantity

Substances	CAS Number	CERCLA RQ
Crystalline silica, quartz	14808-60-7	Not applicable

EPA RCRA Hazardous Waste Classification
If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65

Substances	CAS Number	California Proposition 65
Crystalline silica, quartz	14808-60-7	carcinogen

U.S. State Right-to-Know Regulations

Substances	CAS Number	MA Right-to-Know Law	NJ Right-to-Know Law	PA Right-to-Know Law
Crystalline silica, quartz	14808-60-7	Carcinogen Extraordinarily hazardous	1660	Present

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0*, Flammability 0, Physical Hazard 0 , PPE: E

Canadian Regulations

Canadian Domestic Substances List (DSL) All components listed on inventory or are exempt.

16. Other information

Preparation Information

Prepared By
Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

Revision Date: 14-Aug-2017

Reason for Revision
SDS sections updated:
2
8
11

Additional information
For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key or legend to abbreviations and acronyms used in the safety data sheet
bw – body weight
CAS – Chemical Abstracts Service
d - day
EC50 – Effective Concentration 50%
ErC50 – Effective Concentration growth rate 50%
h - hour
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
mg/m^3 - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PEL – Permissible Exposure Limit
ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
UN – United Nations
w/w - weight/weight

Key literature references and sources for data
www.ChemADVISOR.com/

Disclaimer Statement
This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The

information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

End of Safety Data Sheet

HALLIBURTON

SAFETY DATA SHEET

Product Trade Name: **HOLEPLUG® 3/8**

Revision Date: 14-Aug-2017 **Revision Number:** 17

1. Identification

1.1. Product Identifier

Product Trade Name: HOLEPLUG® 3/8
Synonyms None
Chemical Family: Mineral
Internal ID Code HM003667

1.2 Recommended use and restrictions on use

Application: Fluid Loss Additive
Uses advised against No information available

1.3 Manufacturer's Name and Contact Details

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton Energy Services, Inc.
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000

Halliburton Energy Services, Inc.
645 - 7th Ave SW Suite 1800
Calgary, AB
T2P 4G8
Canada

Prepared By Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

1.4. Emergency telephone number:

Emergency Telephone Number 1-866-519-4752 or 1-760-476-3962
Global Incident Response Access Code: 334305
Contract Number: 14012

2. Hazards Identification

2.1 Classification in accordance with paragraph (d) of §1910.1200

Carcinogenicity	Category 1A - H350
Specific Target Organ Toxicity - (Repeated Exposure)	Category 1 - H372

2.2. Label Elements

Hazard Pictograms

Signal Word: Danger

Hazard Statements
H350 - May cause cancer by inhalation
H372 - Causes damage to organs through prolonged or repeated exposure if inhaled

Precautionary Statements

Prevention
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P280 - Wear protective gloves/eye protection/face protection

Response
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P314 - Get medical attention/advice if you feel unwell

Storage
P405 - Store locked up

Disposal
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations

2.3 Hazards not otherwise classified

This product contains Wyoming bentonite or other sorptive clays. Crystalline silica forms found in this particular clay are limited to quartz. Extreme temperatures that can generate cristobalite or tridymite are not expected to occur under realistic conditions. In addition, all quartz found in sorptive clays are considered “occluded”, i.e., strongly coated with an amorphous silica surface. Occluded quartz has been experimentally-determined to be relatively non-toxic compared to unoccluded quartz. A lack of health effects found in several studies examining occupational exposure to sorptive clays also suggest that chronic inhalation of sorptive clays is not expected to result in silicosis or cancer. In light of these findings OSHA has recently exempted Wyoming bentonite and other sorptive clays from the crystalline silica PEL in §1910.1053(a)(1)(iii).

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - US
Crystalline silica, quartz	14808-60-7	1 - 5%	Carc. 1A (H350) STOT RE 1 (H372)

The exact percentage (concentration) of the composition has been withheld as proprietary.

4. First Aid Measures

4.1. Description of first aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Skin Wash with soap and water. Get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

4.2 Most important symptoms/effects, acute and delayed

Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

Suitable Extinguishing Media

All standard fire fighting media

Extinguishing media which must not be used for safety reasons

None known.

5.2 Specific hazards arising from the substance or mixture

Special exposure hazards in a fire

Not applicable

5.3 Special protective equipment and precautions for fire-fighters

Special protective equipment for firefighters

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use appropriate protective equipment. Avoid creating and breathing dust.
See Section 8 for additional information

6.2. Environmental precautions

None known.

6.3. Methods and material for containment and cleaning up

Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. Handling and storage

7.1. Precautions for safe handling

Handling Precautions

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Information

Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. Exposure Controls/Personal Protection

8.1 Occupational Exposure Limits

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Crystalline silica, quartz	14808-60-7	TWA: 50 µg/m³	TWA: 0.025 mg/m³

Exposures to crystalline silica that result from bentonite or other sorptive clays are exempt from the PEL in §1910.1053. The PEL in §1910.1000 Table Z–3 (i.e., the formula that is approximately equivalent to 100 µg/m³) applies to occupational exposures to respirable crystalline silica from sorptive clays.

8.2 Appropriate engineering controls

Engineering Controls Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits.

8.3 Individual protection measures, such as personal protective equipment

Personal Protective Equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)

Hand Protection Normal work gloves.

Skin Protection Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State: Solid
Color Various
Odor: Odorless
Odor Threshold: No information available

Property Remarks/ - Method	Values
pH:	7.5
Freezing Point / Range	No data available
Melting Point / Range	No data available
Boiling Point / Range	No data available
Flash Point	No data available
Flammability (solid, gas)	No data available
Upper flammability limit	No data available
Lower flammability limit	No data available
Evaporation rate	No data available
Vapor Pressure	No data available
Vapor Density	No data available
Specific Gravity	2.12
Water Solubility	Insoluble in water
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	No data available
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

VOC Content (%) No data available

10. Stability and Reactivity

10.1. Reactivity
Not expected to be reactive.

10.2. Chemical stability
Stable

10.3. Possibility of hazardous reactions
Will Not Occur

10.4. Conditions to avoid
None anticipated

10.5. Incompatible materials
Hydrofluoric acid.

10.6. Hazardous decomposition products
Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).

11. Toxicological Information

11.1 Information on likely routes of exposure
Principle Route of Exposure Eye or skin contact, inhalation.

11.2 Symptoms related to the physical, chemical and toxicological characteristics
Acute Toxicity

Inhalation Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Eye Contact May cause mechanical irritation to eye.
Skin Contact None known.
Ingestion None known.

Chronic Effects/Carcinogenicity Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology

Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2). There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

This product contains Wyoming bentonite or other sorptive clays. Crystalline silica forms found in this particular clay are limited to quartz. Extreme temperatures that can generate cristobalite or tridymite are not expected to occur under realistic conditions. In addition, all quartz found in sorptive clays are considered “occluded”, i.e., strongly coated with an amorphous silica surface (Wendlandt et al., 2007; Hochella and Muryama, 2010; SMI, 2014). Occluded quartz has been experimentally-determined to be relatively non-toxic compared to unoccluded quartz (Geh et al., 2006; Creutzenberg et al., 2008). A lack of health effects found in several studies examining occupational exposure to sorptive clays also suggest that chronic inhalation of sorptive clays is not expected to result in silicosis or cancer (Waxweiler et al., 1988; ACGIH, 1991; USEPA, 1996; IARC, 2005). In light of these findings OSHA has recently exempted Wyoming bentonite and other sorptive clays from the crystalline silica PEL in §1910.1053(a)(1)(iii).

11.3 Toxicity data

Toxicology data for the components

Substances	CAS Number	**LD50 Oral**	**LD50 Dermal**	**LC50 Inhalation**
Crystalline silica, quartz	14808-60-7	> 15000 mg/kg (human)	No data available	No data available

Substances	**CAS Number**	**Skin corrosion/irritation**
Crystalline silica, quartz	14808-60-7	Non-irritating to the skin

Substances	**CAS Number**	**Serious eye damage/irritation**
Crystalline silica, quartz	14808-60-7	Non-irritating to the eye

Substances	**CAS Number**	**Skin Sensitization**
Crystalline silica, quartz	14808-60-7	No information available.

Substances	**CAS Number**	**Respiratory Sensitization**
Crystalline silica, quartz	14808-60-7	No information available

Substances	**CAS Number**	**Mutagenic Effects**
Crystalline silica, quartz	14808-60-7	Not regarded as mutagenic.

Substances	**CAS Number**	**Carcinogenic Effects**
Crystalline silica, quartz	14808-60-7	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure.

Substances	**CAS Number**	**Reproductive toxicity**
Crystalline silica, quartz	14808-60-7	No information available

Substances	**CAS Number**	**STOT - single exposure**
Crystalline silica, quartz	14808-60-7	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	**CAS Number**	**STOT - repeated exposure**
Crystalline silica, quartz	14808-60-7	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)

Substances	**CAS Number**	**Aspiration hazard**
Crystalline silica, quartz	14808-60-7	Not applicable

12. Ecological Information

12.1. Toxicity

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Crystalline silica, quartz	14808-60-7	EC50 (72 h) =440 mg/L (Selenastrum capricornutum)(similar substance)	LL0 (96 h) =10000 mg/L (Danio rerio)(similar substance)	No information available	LL50 (24 h) >10000 mg/L (Daphnia magna)(similar substance)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Crystalline silica, quartz	14808-60-7	The methods for determining biodegradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Crystalline silica, quartz	14808-60-7	No information available

12.4. Mobility in soil

Substances	CAS Number	Mobility
Crystalline silica, quartz	14808-60-7	No information available

12.5 Other adverse effects

No information available

13. Disposal Considerations

13.1. Waste treatment methods

Disposal methods If practical, recover and reclaim, recycle, or reuse by the guidelines of an approved local reuse program. Should contaminated product become a waste, dispose of in a licensed industrial landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. Transport Information

US DOT

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Canadian TDG

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

IMDG/IMO

UN Number	Not restricted
UN proper shipping name:	Not restricted
Transport Hazard Class(es):	Not applicable
Packing Group:	Not applicable
Environmental Hazards:	Not applicable

IATA/ICAO

UN Number	Not restricted
UN proper shipping name:	Not restricted
Transport Hazard Class(es):	Not applicable
Packing Group:	Not applicable
Environmental Hazards:	Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable
Special Precautions for User None

15. Regulatory Information

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

TSCA Significant New Use Rules - S5A2

Substances	CAS Number	TSCA Significant New Use Rules - S5A2
Crystalline silica, quartz	14808-60-7	Not applicable

EPA SARA Title III Extremely Hazardous Substances

Substances	CAS Number	EPA SARA Title III Extremely Hazardous Substances
Crystalline silica, quartz	14808-60-7	Not applicable

EPA SARA (311,312) Hazard Class
Chronic Health Hazard

EPA SARA (313) Chemicals

Substances	CAS Number	Toxic Release Inventory (TRI) - Group I	Toxic Release Inventory (TRI) - Group II
Crystalline silica, quartz	14808-60-7	Not applicable	Not applicable

EPA CERCLA/Superfund Reportable Spill Quantity

Substances	CAS Number	CERCLA RQ
Crystalline silica, quartz	14808-60-7	Not applicable

EPA RCRA Hazardous Waste Classification
If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65

Substances	CAS Number	California Proposition 65
Crystalline silica, quartz	14808-60-7	carcinogen

U.S. State Right-to-Know Regulations

Substances	CAS Number	MA Right-to-Know Law	NJ Right-to-Know Law	PA Right-to-Know Law
Crystalline silica, quartz	14808-60-7	Carcinogen Extraordinarily hazardous	1660	Present

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0*, Flammability 0, Physical Hazard 0 , PPE: At

Canadian Regulations

Canadian Domestic Substances List (DSL) All components listed on inventory or are exempt.

16. Other information

Preparation Information

Prepared By
Chemical Stewardship
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Revision Date: 14-Aug-2017

Reason for Revision SDS sections updated:
2
8
11

Additional information
For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key or legend to abbreviations and acronyms used in the safety data sheet
bw – body weight
CAS – Chemical Abstracts Service
d - day
EC50 – Effective Concentration 50%
ErC50 – Effective Concentration growth rate 50%
h - hour
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
mg/m^3 - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PEL – Permissible Exposure Limit
ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
UN – United Nations
w/w - weight/weight

Key literature references and sources for data
www.ChemADVISOR.com/
NZ CCID

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End of Safety Data Sheet