

**CERCLA
TIME-CRITICAL REMOVAL ACTION MEMORANDUM
FOR THE
BARBARA J MINE COMPLEX
GRANTS, NEW MEXICO**

**U.S. Bureau of Land Management
Farmington Field Office**

September 2015

I. PURPOSE

The purpose of this action memorandum is to seek approval of and to document the basis for the U. S. Bureau of Land Management's (BLM) decision to conduct a time-critical removal action (TCRA) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at the Barbara J legacy uranium mine site (Site).

The proposed action is a TCRA because of risks to human health and the environment from uranium and metals exposure at the Site and from potential migration via wind and rain of hazardous substances off-Site, potentially reaching the San Mateo Creek.

II. SITE CONDITIONS AND BACKGROUND

This section describes the Site, other actions taken, and the role of state and local authorities.

A. Site Description

The Barbara J Site is a complex of several abandoned underground uranium mines in the Grants Uranium District of northwest New Mexico. The Site is divided into three separate mines, the Barbara J 1, Barbara J 2, and Barbara J 3. Each was developed with one or more shaft, vent holes and numerous drill holes. This removal action is concerned mainly with four waste rock disposal areas, although mine openings (shafts, vents, and drill holes) and certain load out areas will also be addressed.

The Site is approximately 12 miles north of the town of Grants and within the Ambrosia Lake subdistrict (Figure 1). The legal description is T. 13 N., R. 9 W. N ½ section 30. It is drained by Poison Canyon arroyo and tributary washes that drain to San Mateo Creek, a large ephemeral arroyo about 1.5 miles east of the Site (Figure 2).

The mines were developed where Jurassic strata are exposed along the southwest side of a northeast-dipping cuesta known as Mesa Montanosa. Ore was mined from carbonate sedimentary rocks of the Todilto Formation. Piping found on site and records indicate that dewatering operations occurred at some of the mines. However, the Todilto is not known to be an aquifer. The two primary aquifers of the watershed are the alluvium of San Mateo Creek and the San Andres Formation, which is hundreds of feet below the Todilto Formation. Chinle Group redbeds form an aquiclude between the Todilto and San Andres. Local perched groundwater may be present as indicated by the mine records and in the underlying Chinle Group, but not enough information is available to know if they connect to drinking water sources. Groundwater would tend to flow northeast in the direction of the dip of the sedimentary layers.

Uranium ore extraction occurred off and on throughout the 1950's and 60's and was transported

off-site for milling. Operations resulted in the deposition of waste rock in four main disturbance areas associated with a particular mine shaft (Figure 3). The waste rock occurs in piles and thin surface cover. The piles have somewhat revegetated with small junipers. The greatest thickness of waste rock was estimated at 20 ft.

The workings are 300 to 460 ft deep and the shafts were closed in the 1990's although some have subsided. The Site is scattered with mining debris including a winch, piping, and concrete footings and pads.

The closest residences are three miles away and there is an irrigation well one mile southeast from the Site. The New Mexico Environmental Department (NMED) measured 48.2 micrograms per liter uranium in this well but it is not known what the source of contamination is.

Although the Site is located in a remote area, it is visited by BLM and State of New Mexico workers. These workers have been conducting Site assessment, remediation planning and related work since 2009 and visit the Site at least once a year. Site visits last an average of two hours. Ranchers and their cattle also visit the Site creating the potential for cows to ingest potentially contaminated vegetation. Lands in the Grants Uranium District may also be used by hikers, campers, users of all-terrain vehicles, and other recreationists. Pursuant to 43 CFR 8365.1-2(a) and BLM New Mexico Supplementary Rules, campers may stay no longer than two weeks in any one location on BLM lands, including near the Barbara J mines.

The Site occurs in semi-desert grassland and shrub steppe with some Pinyon-Juniper woodlands and is home to mule deer, rodents, cottontail rabbits, coyote, jack rabbits, and raptors such as Red-tailed hawk, Great horned owls, and Peregrine falcons (New Mexico Energy, Minerals, and Natural Resources Department Environmental Assessment, Proposed Safeguarding and Reclamation of the Poison Canyon Abandoned Uranium Mines in McKinley County, New Mexico).

B. The Release Or Threatened Release Of Hazardous Substances

The NMED conducted site assessments of mines in the Poison Canyon Area including the Barbara J Complex on July 1, 2009. The State recommended that physical openings be closed, piles with elevated radioactivity be removed, and that further evaluations be conducted to assess potential impacts to groundwater and surface drainages.

Site evaluations conducted by Golder Associates on behalf of the New Mexico Mining and Minerals Division of the Energy, Mining and Natural Resources Department in 2009 and NMED in 2009 detected elevated gamma radiation at the Site and recommended further investigation.

Ionizing gamma radiation levels at the site were measured in the Golder Associates 2009 study and found to range from 15 to 2,000 microR/hr with the higher readings associated with waste rock material. Soil concentrations of Ra²²⁶ range from 1.2 to 980 pCi/g and total uranium

concentrations range from 1.3 to 3,000 mg/kg. The “hot spots” correlate to waste rock piles and load out areas.

A Site Evaluation was conducted by Ecology and Environment, Inc. on behalf of the BLM in 2013 to evaluate other potential contaminants of concern. The evaluation concluded that there are concentrations of manganese in the soil that exceed New Mexico soil screening levels for workers. The metal is found associated with the disturbed areas and in arroyo sediments that drain the site. The study also shows that there is potential for the site to leach metals at levels that exceed New Mexico Administrative Code Groundwater Standards. These include aluminum, arsenic, chromium, cobalt, copper, iron, lead, manganese, nickel, uranium, and zinc.

Potential pathways for transport of contaminated materials to human and ecological receptors are direct exposure to gamma radiation, dust inhalation, plant uptake and ingestion by animals and sediment transport along arroyos. (Final Barbara J Legacy Uranium Mine Site Evaluation, August 2013).

There may also be threats to groundwater through open boreholes providing a conduit for transport of migrating hazardous materials and from leaching of metals, as noted in the 2013 study. Not enough is known of the hydrogeologic system to know if a groundwater exposure pathway exists. A potential pathway for contamination of surface water may be migration of contaminated soil and surface transport along Poison Canyon, which drains to San Mateo Creek and the alluvial aquifer. Further studies to determine the nature and extent of any such threat are underway pursuant to Environmental Protection Agency’s (EPA) Five Year Plan, discussed below. The TCRA will address the threat of direct exposure. Threats to ground or surface water, if any, will be addressed separately.

C. Other Actions Taken

The Grants Uranium District includes a number of abandoned uranium mines on private, tribal, and public property. Pursuant to a Memorandum of Understanding (MOU), EPA and the BLM are working cooperatively to address these mines. In addition, a working group of stake holders within the Grants Uranium District has been established that includes representatives from the BLM and EPA, as well as the NMED, U. S. Forest Service, New Mexico Department of Health, Department of Energy, and the New Mexico Energy Minerals and Natural Resources Department, which meets regularly to discuss remediation progress. Because the Barbara J mines are entirely on BLM-managed lands, BLM is the lead agency addressing remediation at the Site.

In 2009, the NMED conducted site assessments of mines in the Poison Canyon Area including the Barbara J Complex. The State recommended that physical openings be closed, piles with elevated radioactivity be removed, and further evaluations be conducted to assess potential impacts to groundwater and surface drainages.

The BLM and the New Mexico Abandoned Mine Lands Program (NMAMLP), a program within the New Mexico Energy, Minerals, and Natural Resources Department, have an active cooperative program under their respective regulatory frameworks to develop site assessments and engineering designs for approximately 20 abandoned mine sites located on BLM land using the BLM's Abandoned Mine Land 1620 fund. This work is concentrated in the Poison Canyon area of the Ambrosia Lake Subdistrict (Figure 4), and includes the Site. The BLM has worked with the NMAMLP to characterize the Site, and closures of the mine shafts and vent shafts were conducted by the NMAMLP in the 1990's. Many of those closures have since subsided. Site evaluations conducted by the NAMLP in 2007 and the NMED in 2009 recommended additional work to replace or repair those closures, closing other physical openings, and further evaluation of the Site under CERCLA.

A study by Golder Associates on behalf of NMAMLP evaluated the risks to public health and safety from both physical hazards present at the Site and exposure to radioactive materials. The study documents spikes in radiation readings that correspond to the waste piles. There is a noticeable increase in radiation at the edges of piles to 30 pCi/g Ra²²⁶ and spikes of several hundred pCi/g Ra²²⁶ within the piles. Soil concentrations drop off to background levels just beyond the piles. The Golder Associates study recommended an action level of 100 pCi/g Ra²²⁶ in order to protect public health from radiological hazards. They further recommended that cleanup should be guided by the 30 pCi/g Ra²²⁶ isorad in order to facilitate visually based cleanup of the man-made disturbances (the waste piles). These numbers were based on conspicuous increases in soil concentrations and not on regulatory limits.

In 2010, a BLM Health Physicist consultant modeled potential exposure pathways, including recreational activity and meat ingestion from grazing animals, and concluded that in order to achieve EPA's recommended maximum post-cleanup public exposure levels of 15 mrem/yr¹, clean-up to at least 115 pCi/g Ra²²⁶ would be required. Therefore, BLM and NMAMLP agreed to follow the Golder Associates cleanup recommendations.

In 2010, EPA prepared the *Assessment of Health and Environmental Impacts of Uranium Mining and Milling, Five Year Plan Grants Mining District New Mexico* (Five Year Plan). The purpose of the Five Year Plan was "to compile all activities contributing to the identification and cleanup of legacy uranium milling and mining activities in the Grants Mining District" and to serve as a basis to coordinate federal, state, and tribal responses to contamination. The Five Year Plan was developed considering public comments gathered at a public meeting, as well as communications with New Mexico State Legislature and the Multicultural Alliance for a Safe Environment. The Five Year Plan, which identifies the Barbara J mines as a "high priority," is currently being updated.

¹ Although not a promulgated rule, EPA guidance states that 15 mrem/yr should generally be the maximum dose level allowed at CERCLA sites (OSWER Mo. 9200.4-18). EPA believes this dose is within the upper level of acceptable cancer risk. BLM has considered this guidance in setting cleanup levels for this removal action. The proposed action will achieve a residual radioactivity far below this dose limit.

D. Regulatory Framework

Pursuant to Executive Order 12580, as amended by Executive Order 13016, the President delegated authority to the Department of the Interior to conduct removal actions under CERCLA with respect to property under the jurisdiction, custody, or control of DOI. The Secretary has redelegated that authority to the BLM for lands under BLM management. In recognition of this authority, and in view of the release or threat of release of hazardous substances at the Site, EPA has requested that the BLM undertake a response action at the Site.

The National Contingency Plan (NCP), 40 C.F.R Part 300, governs investigation and remediation of hazardous substances pursuant to CERCLA. The decision to undertake a removal action is addressed in 40 C.F.R. § 300.415(b)(2), which identifies several factors a lead agency is to consider in determining whether a removal action is appropriate. As detailed below, the BLM has considered the factors identified and determined that a removal action is appropriate in light of the actual and potential risks to humans, animals, and the food chain from exposure to radioactive materials at the Site as well as the fact that contamination at the Site is at surface level and may migrate off the Site via wind or rainfall, with the potential to reach the San Mateo Creek.

The NCP also requires that if an agency determines that a removal action is appropriate, that “actions shall, as appropriate, begin as soon as possible” to address the threat identified. The BLM is prepared to begin on-site activities within six months.

III. NPL Status

The Barbara J Complex is not listed on the national priority list (NPL) and is currently not proposed for listing.

IV. Maps

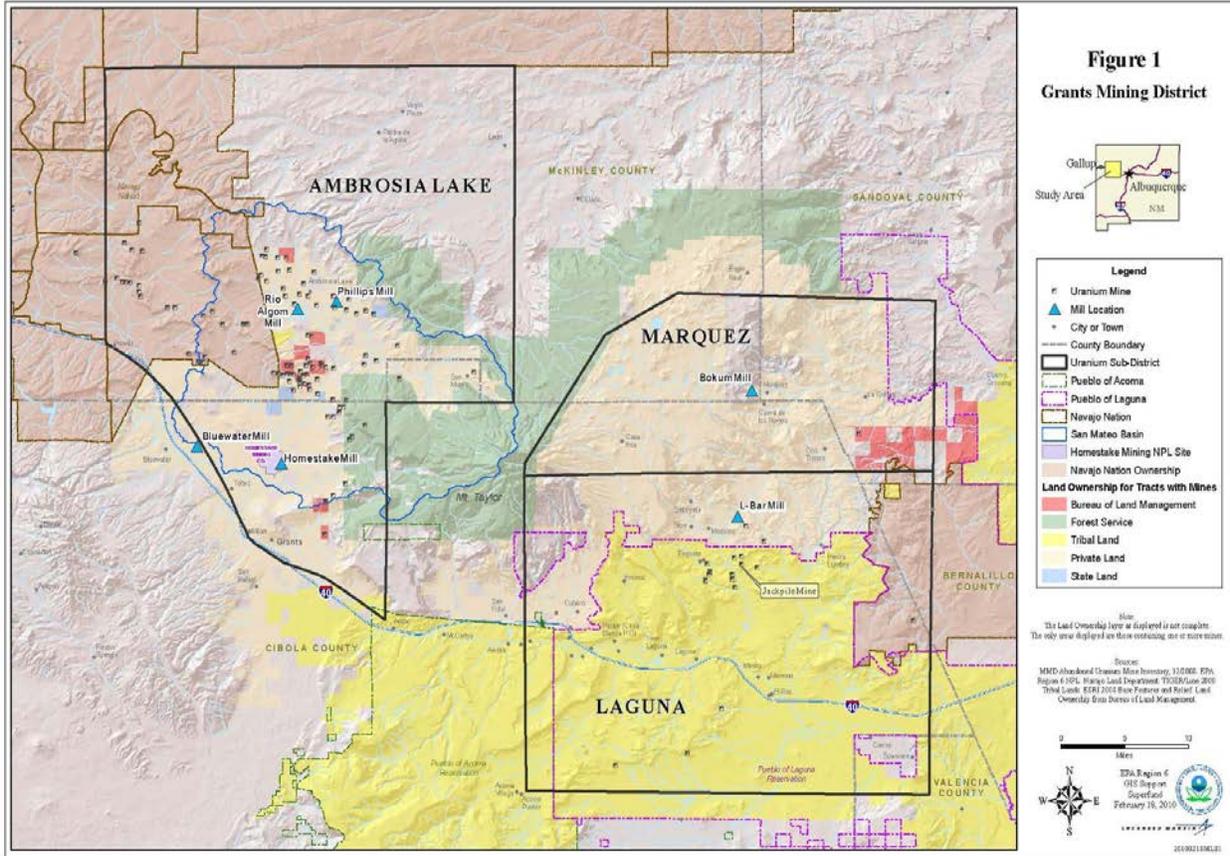


Figure 1. Map of the Grants Uranium District showing the location of the Ambrosia Lake subdistrict.

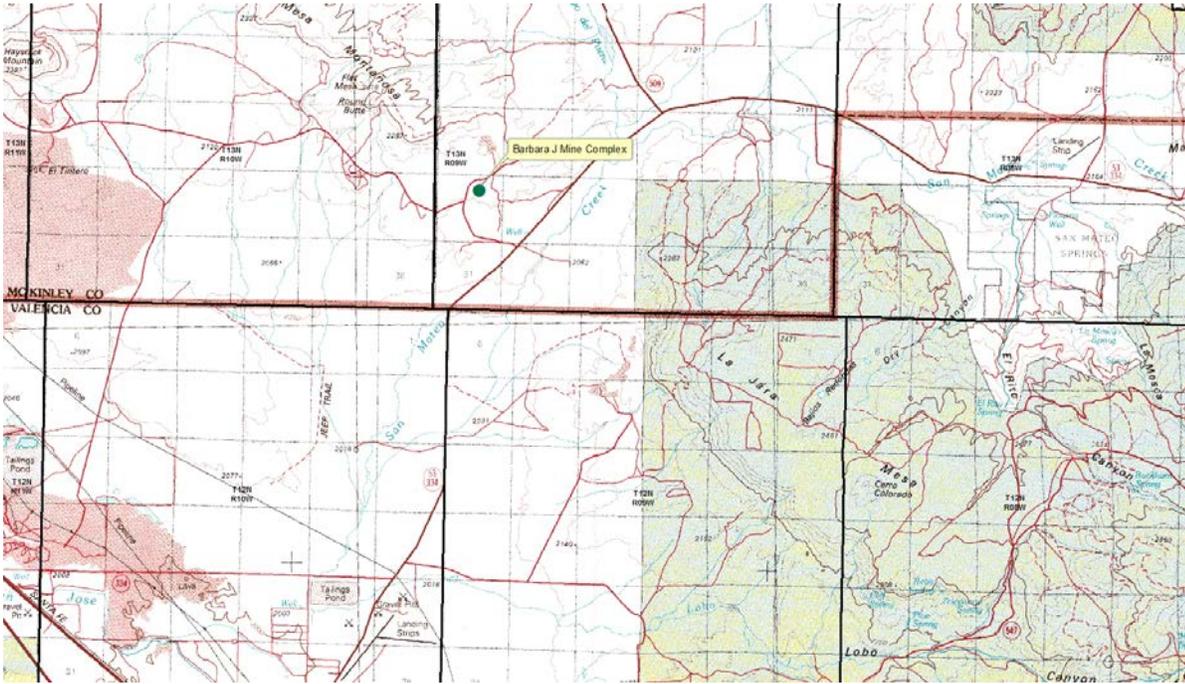


Figure 2. Location map of the Barbara J Mine Complex.

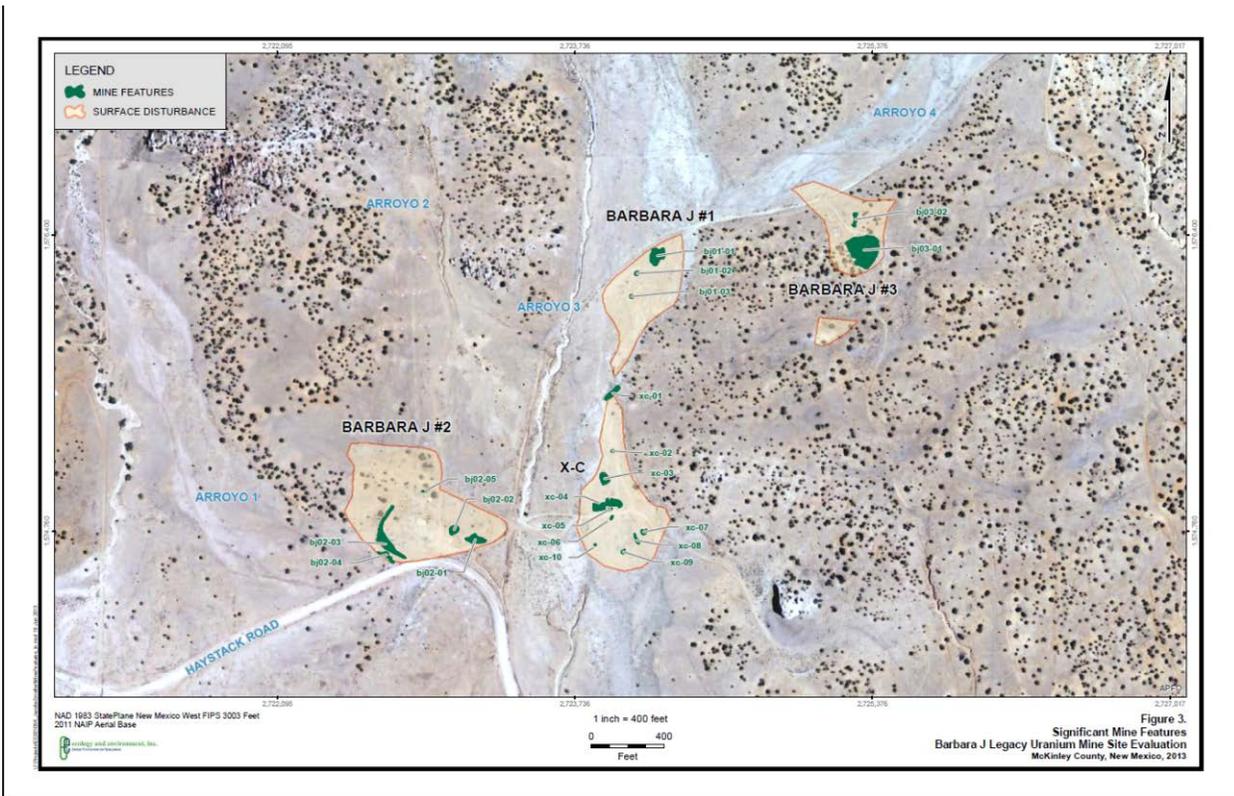


Figure 3. Site map showing the location of waste rock piles.

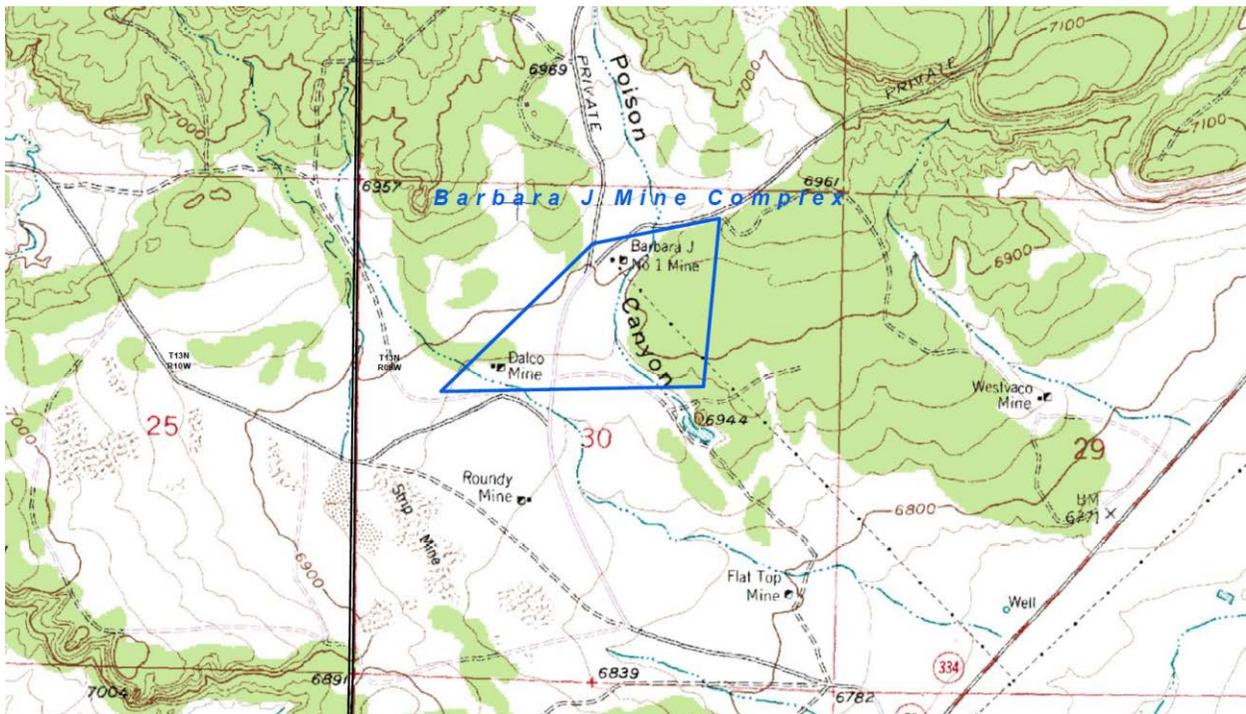


Figure 4. The Site in relation to other legacy mines in the Poison Canyon Area.

V. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

The BLM has determined that threats to public health or welfare and the environment at the Site necessitate a time-critical removal action pursuant to CERCLA Section 104(a) and 40 C.F.R. § 30.415. Direct contact with contaminated soil derived from historic mine wastes may pose a threat to human health and ecological receptors. Waste rock at the Site contains radiometric levels as high as 2,000 μ R/hr and uranium concentrations as high as 3,000 mg/kg. In addition, soil and sediment contain elevated levels of manganese that exceed the New Mexico Soil Screening Level for worker human exposure scenario. Mine wastes eroding into arroyos could potentially impact downstream surface water and alluvial aquifers. The proposed TCRA will eliminate this potential source of contamination to surface and alluvial aquifers and will address waste rock/soil/sediment exposure pathways.

Other threats to the groundwater pathway are largely unknown because groundwater modeling is poorly constrained in this area. Pursuant to the Five Year Plan, additional study of groundwater in the Grants Uranium District is underway. Additional work to address threats to groundwater, if any, may be warranted, depending on the results of those studies. Any such threat will be addressed separately.

A time-critical removal action is necessary at the Site to prevent human and ecological exposure to high levels of uranium and radiological hazards, to prevent accumulation of uranium in the food chain, and to prevent the continued migration of uranium and metals. The proposed removal action is intended to reduce the following threats from contamination:

- **Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.** The Site is visited by BLM workers, ranchers, and potentially by campers, hikers, and other recreationists. Humans working or recreating at the Site may be exposed to radiation, uranium, and manganese from waste rock and mine openings. In addition, cattle graze in the area and may be exposed to and consume contaminated soil or plants. Other animals at the Site that could be exposed to contaminants include Mule deer, cottontail rabbits, and jack rabbits.
- **High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate.** Uranium and Ra²²⁶ is known to be present in elevated concentrations in waste rock at the Site. The waste rock piles are a source of gamma radiation and metals that could migrate off the Site via wind and water transport mechanisms including mechanical dust generation and rainfall potentially reaching San Mateo Creek.

V. ENDANGERMENT DETERMINATION

Actual and/or threatened releases of hazardous substances, if not addressed by implementing the time-critical removal action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

VI. PROPOSED ACTIONS

This section describes the proposed time-critical removal action, its contribution to remedial response, applicable or relevant and appropriate requirements (ARARs), proposed schedule and cost estimate.

A. Proposed Action

As described in more detail above, in its 2009 study on behalf of NMAMLP, Golder Associates, Inc. recommended an action level of 100 pCi/g Ra²²⁶ in order to protect public health from radiological hazards present in the waste piles at the Site. They further recommended that cleanup should include visible scattered waste on the ground surface above the 30 pCi/g Ra²²⁶ isorad. The recommendation was based on the fact that the 30 pCi/g contour coincides very closely to the edge of the waste piles left behind by past mining and soil concentrations drop off to background levels just beyond the piles. These action levels comply with ARARs listed below and are conservative enough to protect the public using the non-residential, short-term visitor criteria.

The proposed CERCLA time-critical removal action consists of:

An on-site repository to be excavated near the Barbara J3 Mine. All visible waste rock will be collected, which is expected to include all materials exceeding 30 pCi/g of Ra²²⁶. An 11,000 cu. yds pit will be excavated to receive all collected waste rock materials. Material totaling approximately 9,000 cu. yds will be excavated and transported to the repository using conventional earthmoving equipment. The repository will be constructed well above the water table so as not to jeopardize groundwater and will be capped with 3 ft of soil. As recommended, a confirmatory radiation study will be conducted to ensure all contaminated material has been collected and confined. Earthmoving equipment and site workers will be decontaminated according to the NMAMLP Project Manual for the Grants Uranium – Phase III Mine Safeguard and Reclamation Project.

Waste rock features that will be excavated and removed are shown in Figure 3.

In addition to the hazardous waste cleanup, seven mine shafts will be backfilled where previous backfills have subsided.

The proposed remedy is similar to those implemented at other abandoned uranium mines in the

Grants Uranium District such as the San Mateo Mine on the Cibola National Forest 6.5 miles east of the Site.

B. Contribution to Long-term Cleanup Performance

The proposed time-critical removal action will provide protection for human and ecological receptors by removing exposure pathways. It will comply with ARARs and the NCP, and will safely manage radioactive materials at the Site. The removal action will address potential exposure from recreational activity and meat ingestion of grazing animals and migration to surface waters and alluvial aquifers. BLM models determined that remediation to at least 115 pCi/g Ra²²⁶ is necessary to achieve ARARs. Addressing visible waste near the edges of the waste piles will result in a more complete remediation and a conservative exposure level of 30 pCi/g Ra²²⁶. In addition, the 2013 Site Evaluation found levels of manganese in the soil that exceed New Mexico soil screening levels for workers. Areas of elevated manganese correlate with the radiation “hot spots”. Addressing the radiation as described, therefore, will also address manganese contamination.

C. Applicable or Relevant and Appropriate Requirements (ARARs)

This time-critical removal action shall, considering the urgency of the situation and the scope of the removal action to be performed, attain ARARs under Federal or State environmental laws. Other Federal and State advisories, criteria, or guidance may, as appropriate, be considered in formulating the time-critical removal action. (40 C.F.R. § 300.415 (j)). In choosing the ARARs, the BLM will take into account the recreational two week camping limitation provided in 43 CFR 8365.1-2(a) and the BLM New Mexico Supplementary Rules as the maximum degree of exposure that is reasonably foreseeable.

ARARs are summarized below:

- 40 CFR 61.102(a) National Emission Standards for Radionuclide Emissions From Federal Facilities Other Than Nuclear Regulatory Commission Licensees and Not Covered by Subpart H
- New Mexico Administrative Code Title 20, Chapter 6, Part 2
- General National Pollutant Discharge Elimination System (NPDES) Permit for Stormwater Discharges Associated with Construction Activity, Order 99-08-DWQ
- Clean Water Act, Section 404, 33 USC 1344 (Regulates discharge of dredge or fill material into waters of the U.S.)

- National Historic Preservation Act, 16 USC 470 et seq.; 36 CFR Part 800
- Archaeological Resources Protection Act of 1979, 16 USC Sections 47000-47011; 43 CFR Part 7
- Native American Graves Protection and Repatriation Act, 25 USC Section 3001 et seq. and its implementing regulations, 43 CFR Part 10.

To be Considered:

- New Mexico Environmental Department Soil Screening Levels Revision 4.0.
- OSWER No. 9200.4-18 Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination
 - 15 mrem/yr Minimally Acceptable Dose Limit from residual radioactive materials following a response action.

D. Project Schedule

The proposed time-critical removal action is scheduled to begin in October 2015.

E. Estimated Costs

A cost estimate has been completed for the proposed time-critical removal action items listed in section A above. The total estimated cost for the action items is approximately \$600,000.00.

VIII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If action is delayed or not taken, uranium will continue to be available for uptake by workers, ranchers, recreationists, cattle, and other animals, and could potentially be transported to surface or groundwater.

IX. OUTSTANDING POLICY ISSUES

None currently identified.

X. ENFORCEMENT

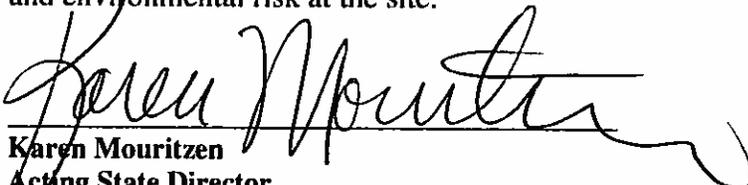
There are currently no regulatory enforcement activities under CERCLA, Resource Conservation and Recovery Act, the Clean Water Act, Porter-Cologne Act or other regulations. The BLM has conducted a PRP search for the Site. The Office of the Solicitor is currently reviewing that report and considering whether enforcement actions should be undertaken. The BLM will continue working with the Office of the Solicitor on cost recovery.

XI. RECOMMENDATION

On the basis of the evaluations conducted and the factors identified in the NCP, the BLM has determined that a time-critical removal action is necessary at the Site to prevent or significantly reduce human and ecological exposure to high levels of uranium and radioactivity, to reduce uranium accumulation in the food chain, and to reduce or eliminate the continued migration from the Site of waste rock contaminated with metals and/or radioactive materials. The proposed time-critical removal action will be performed in consideration of human health concerns and potential final environmental remedies and in compliance with the NCP.

CERCLA ACTION – AUTHORIZATION

Environmental conditions associated with uranium contamination at the Site meet the NCP requirement for a time-critical removal action. I approve the BLM's proposal to perform a TCRA as proposed herein. The proposed action follows remedies conducted at other mines within the Grants Uranium Belt. The proposed BLM CERCLA time-critical removal action meets the removal action objectives identified in this document, in order to reduce human health and environmental risk at the site.



Karen Mouritzen
Acting State Director
U. S. Bureau of Land Management
New Mexico State Office

9-17-15
DATE