New Mexico Uranium Reclamation 2024 Strategic Plan

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Executive Summary

Passed in 2022, New Mexico House Bill 164 mandates a comprehensive, multilateral approach for cleaning up former uranium mine and mill sites across New Mexico. The bill establishes authority to cleanup neglected sites that up until now have not been addressed under existing regulations. It also presents a new approach toward on-going uranium cleanup efforts that emphasizes strong coordination in New Mexico between state and federal agencies, Indian nations, tribes and pueblos, industry, communities impacted by uranium mining, and other states working on uranium reclamation and workforce activities.

The purpose of this *New Mexico Uranium Reclamation 2024 Strategic Plan (Strategic Plan)* is to provide the New Mexico Environment Department (NMED) a living guide expanding its efforts focused on the environmental impacts of legacy uranium mining in New Mexico. The initiative's three main goals are laid out in the box to the right.

While reclamation efforts have been underway for some time, continued support of these efforts will require sustainable funding, a dedicated workforce, and a coordinated approach. All stakeholders and other key partners in Figure ES 1 play an important role in fostering a leading strategy to protect health and the environment. NMED leads the implementation of the legislation, but the success of these cleanup efforts will be the result of all partners working collaboratively. Cleanup initiatives include tracking former uranium mines and mills across the state, as well as launching a new Uranium Mine Cleanup program framework for neglected sites.

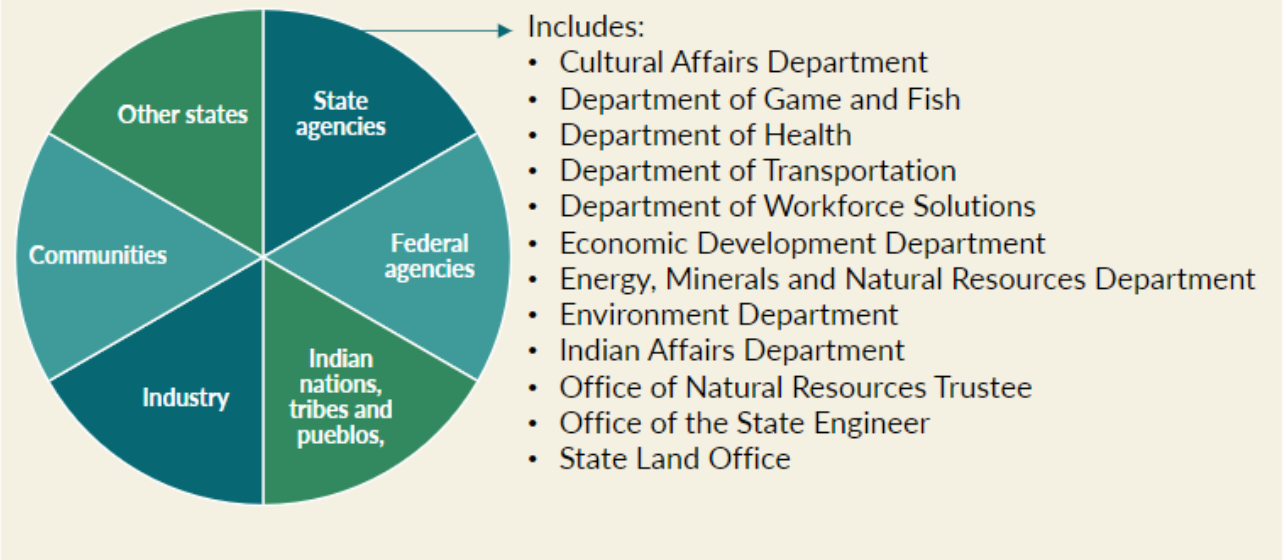
Cleaning up former uranium sites will require billions of dollars of investment over the coming decades. However, these investments can create jobs while improving public health and the environment. This *Strategic Plan* offers a steadfast vision for that important mission.

Goal 1: Coordinate and Consult with NM State Agencies, the Federal Government, Indian Nations, Tribes, Pueblos and Impacted Communities on Uranium Cleanup, and Report to Legislature Regularly on Progress. Cleaning up former uranium mill and mine sites will require multilateral coordination and cooperation among various stakeholders. Although a mandated public engagement process exists for reporting regulatory actions under reclamation permits, there is not a "one-size-fits-all" approach for each of the uniquely regulated sites. This goal encourages transparency of operations with the public and legislature.

Goal 2: Develop a Workforce Supporting Uranium Mine and Mill Reclamation. Environmental cleanup requires a range of professionals who possess specialized skills to support the technical and physical aspects of reclamation. Currently, New Mexico has a significant opportunity to reposition and expand its workforce to support the growing environmental reclamation cleanup industry.

Goal 3: Ensure Sustainable Funding for *Strategic Plan* Implementation. The costs of environmental cleanup are high due to the complex nature of reclamation, including site assessment, remediation activities, long-term monitoring, and occupational safety. Substantial financial resources are necessary to ensure NMED and coordinating agencies have the equipment, expertise, and facilities required for uranium mine reclamation.

Figure ES 1. Stakeholders and other key partners in New Mexico's uranium reclamation cleanup efforts.



For sites where the State of New Mexico has jurisdiction, reclamation is governed by NMED's and the New Mexico Energy, Minerals, and Natural Resources Department's (EMNRD's) regulatory tracks. While the State only has jurisdiction on state and private lands, it coordinates with federal agencies to remove potential roadblocks to reclamation on tribal and federal lands where possible.

To support initial implementation of this *Strategic Plan* and make progress toward the three initiative goals, NMED developed a work plan outlining recommended activities, outcomes, timeframes (short, mid, and long-term), and leading and supporting agencies under each goal. Recommended activities are listed below. See *VI. Work Plan* for more details.

GOAL 1: Coordinate and Consult with NM State Agencies, the Federal Government, Indian Nations, Tribes, Pueblos and Impacted Communities on Uranium Cleanup, and Report to Legislature Regularly on Progress
Develop a Reclamation Goals and Timeline Roadmap.
Launch and update the Former Uranium Mines and Mills Dashboard's mine and mill site regulatory actions on an ongoing basis.
Attend meetings hosted by the community, non-governmental organizations, and federal regulatory agencies.
Develop a webpage for information on uranium mine and mill reclamation efforts, including recent news and annual reports presented to the Radioactive and Hazardous Materials Committee.
Modernize uranium mine and mill reclamation-related data into a central repository.
Develop an Implementation Plan for a Uranium Mine Cleanup Program for neglected sites.
Develop a Coordination Roadmap and Terminology Crosswalk.
GOAL 2: Develop a Workforce Supporting Uranium Mine and Mill Reclamation
Identify key partners and coordinating agencies and establish working relationships and outreach opportunities to collaboratively develop a uranium reclamation workforce. Develop a webpage for outreach for upcoming job training programs and updates on resources available to industry and candidates looking for work in the cleanup industry.
Coordinate and promote a weeks-long, employer-led job training program, as well as building other high-quality and consistent education and training programs to support the uranium reclamation industry.

Coordinate and promote business development and technical assistance programs for reclamation activities.
Identify vacancies and recruit to fill the vacancies in the NMED Water Protection Division.
Collaborate on efforts to promote worker entrance into the uranium cleanup industry, an officially recognized target industry in New Mexico.
GOAL 3: Ensure Sustainable Funding for Strategic Plan Implementation
Develop a Funding Roadmap.
Manage the Uranium Mine Reclamation Revolving Fund (UMRRF) as the mechanism to receive funds for projects related to uranium mine and mill site reclamation.
Establish a policy/procedure to distribute funds from the UMRRF.
Explore potential partnerships with private philanthropic foundations that have supported uranium reclamation cleanup or workforce development efforts, or could support them through related initiatives (e.g., water quality, youth education and empowerment, business innovation).

New Mexico has over 1,100 sites or features of former uranium mining, milling, and exploratory drilling, mostly concentrated in the northwestern part of the state. Approximately 250 sites are considered "Abandoned Uranium Mines", or "AUMs" because they are not associated with a viable responsible party. Further, an estimated 50 sites, located across state, federal, and private lands, are not currently being addressed under a comprehensive regulatory program and do not have the funding required for cleanup. In this *Strategic Plan*, this subset of abandoned uranium mines is referred to as "neglected" sites. Current federal funding available under hard rock abandoned mine land programs is insufficient for the scale and complexity of this challenge. Uranium mine cleanup requires unique protective measures to ensure containment, licensed specialized waste repositories, and long-term maintenance. All these uranium mines contain radioactive material wastes, whether they are found on private, federal, state, or tribal lands.

New Mexico was the largest producer of uranium ore (supplying over 35 million tons, which amounts to nearly half of total domestic ore) and suffered one of the largest radioactive environmental disasters in American history at the Church Rock mill site in 1979. Because uranium was mined to support the interests of the federal government for national security, the State of New Mexico has called for a single source of federal coordination and federal funding for future cleanup efforts. The State of New Mexico cannot solve this problem alone.

Given that each site presents unique challenges, a multilateral approach is needed to address the immense issue, for which this *Strategic Plan* provides the framework and first steps.

I. Purpose

On March 1, 2022, Governor Michelle Lujan Grisham signed House Bill 164 (HB 164). The bill established a new approach to organizing and coordinating the scientific, regulatory, economic, and financial sectors to clean up and reclaim all formerly operating uranium mine and mill sites across New Mexico. It also provided the authority to address neglected sites that no longer have viable operators (responsible parties) and are currently not being addressed by any regulatory authority. In short, HB 164 initiated a multilateral vision to sustain and accelerate uranium mine and mill reclamation efforts for years to come.

Defining Terms

In this *Strategic Plan*, the umbrella term **'former uranium mines and mills'** refers to uranium mine, mill and exploratory sites across the state. None of these sites are currently operating; all are inactive.

At some of these sites, the operator (or "responsible party") is still viable and is responsible for cleaning up identified environmental contamination. At other sites, the company that operated the mine or mill no longer exists (i.e., is no longer viable), or cannot be identified through a search of existing records. This *Strategic Plan* refers to such sites as **'Abandoned Uranium Mines'** or **'AUMs.'** There are an estimated 250 such sites in New Mexico.

Prior to HB 164, a subset of these AUMs, approximately 50 sites across the state, were not being addressed under any cleanup or regulatory framework. The Strategic Plan refers to these as **'neglected'** sites. A key component of this *Strategic Plan* is the launching of a new Uranium Mine Cleanup program to address neglected AUM sites.

HB164 directs NMED to:

1. Coordinate efforts across the state to clean up and reclaim former uranium mine and mill sites, in conjunction with the Energy, Minerals and Natural Resources Department, Indian Affairs Department, Cultural Affairs Department, Department of Game and Fish, Department of Health, Department of Transportation, Department of Workforce Solutions, Economic Development Department, Office of Natural Resources Trustee, and the State Land Office. (NMED later included the Office of the State Engineer because of its involvement in groundwater remediation.)
2. Develop a Strategic Plan for the cleanup of uranium mine and mill sites throughout the state that includes reclamation goals, timelines for the completion of cleanup activities at specific sites, and anticipated funding requirements for the cleanup activities. The bill further directs NMED to consult with the departments and agencies listed above in creating the Strategic Plan.
3. Establish an effective mechanism for consultation and coordination with the federal government, Indian nations, tribes and pueblos, communities impacted by uranium mining, and other states on uranium mine and mill reclamation activities.
4. Work with the Economic Development Department, Department of Workforce Solutions, and industry to establish uranium mine and mill reclamation as a target economic development industry in New Mexico and develop a workforce training program.
5. Develop, maintain, and update on a regular basis a centralized repository of uranium mine and mill sites and reclamation activities. The repository shall include, at minimum, the location, ownership, legal jurisdiction, and cleanup status of each site.
6. On an annual basis, report to the Legislature's interim Radioactive and Hazardous Materials Committee on activities in the preceding year, in consultation with the departments and agencies enumerated above.

This *Strategic Plan* was developed to address the second directive of HB164 listed above. The purpose of this *Strategic Plan* is to provide the New Mexico Environment Department (NMED) a living guide to expand efforts focused on cleaning up the environmental impacts of legacy uranium mining in New Mexico. The *Strategic Plan* will also help ensure transparency on the ongoing cleanup efforts to the public and the New Mexico Legislature. This *Strategic Plan* is intended to be updated over time and includes identified metrics (via recommended activities and outcomes), capacity needed for implementation, and potential financial resources available to accomplish the substantial reclamation efforts required to ensure clean water and land for New Mexicans.

Overall, this *Strategic Plan* will help NMED centralize and coordinate cross-sectoral efforts and leverage opportunities for collaboration among coordinating agencies, as well as develop systems to measure progress and expand efforts to address environmental impacts of uranium mining in the state.

This *Strategic Plan* is organized by the following goals:

- **Goal 1.** Coordinate and consult with New Mexico state agencies, the federal government, Indian nations, tribes, pueblos and impacted communities, and report to the state legislature regularly on cleanup progress.
- **Goal 2.** Develop a workforce supporting uranium mine and mill reclamation.
- **Goal 3.** Ensure sustainable funding for *Strategic Plan* implementation.

An overall work plan to advance progress and achieve these goals is included at the end of this *Strategic Plan*. The work plan includes interim milestones and activities for the short-, mid-, and long- term, as well as identifies lead and supporting entities and targeted outcomes.

The work plan includes the future development of three strategic roadmaps that outline the efforts to follow this *Strategic Plan*:

Reclamation Goals and Timeline Roadmap – This document will report on specific reclamation goals and timelines for cleanup activities, as required by HB 164. The roadmap will group sites into various categories (e.g., based on regulatory authority), and develop broad reclamation goals for each group. The roadmap will detail site attributes (e.g., public accessibility, site size, environmental or health exposure risks, etc.), that could be used to prioritize groups and individual sites for cleanup, and to develop a timeline for reclamation. Reclamation timelines will vary between groups, and within a group due to site specific characteristics. For example, at sites where the U.S. Environmental Protection Agency (EPA) is the lead agency, NMED does not have control over the timeline and reclamation goals may include coordinating with EPA to ensure that state applicable or relevant and appropriate regulations are met. In contrast, at sites where state agencies are the lead, the state has greater autonomy to control the timeline and meet applicable reclamation goals.

Coordination Roadmap – The coordination roadmap will describe how coordination will occur across New Mexico state agencies in implementing the *Strategic Plan* and will outline a mechanism for consultation and coordination with the federal government, Indian Nations, Tribes, Pueblos, communities, and individuals affected by the mining, as required by HB 164. Strategies may include holding quarterly or biannual coordination meetings, forming working groups for the different site categories to develop goals, criteria, and to prioritize activities, and/or the formation of focused small groups comprised of coordinating agency representatives and other parties with site-specific knowledge and expertise, to develop and implement plans for specific sites. For example, agency coordination approaches could include identifying roles and responsibilities of state agencies, holding regular coordination meetings with all agencies and the community, forming working groups for each site category, and forming site-specific teams of experts to develop and implement reclamation plans.

Funding Roadmap – The funding roadmap will lay out approaches and strategies to estimate funding needs to implement the activities described in the *Strategic Plan*. Funding requirements will likely vary by category of site. For example, at Superfund sites where EPA is the lead regulatory authority and there is a viable responsible party, the state's main cost will be staff time. In contrast, neglected sites with no viable responsible party may require supplemental funding mechanisms for site cleanup activities in addition to staff time. The approach to developing funding estimates will be iterative, starting with an initial broad range of costs based on average cost of other reclaimed sites, which will be better defined as more site-specific data and information are collected.

II. Background

Between the 1950s and 1980s, uranium mining was a significant industry in New Mexico. Over the past 30 years, New Mexico has experienced many strides in uranium reclamation efforts and site cleanup that are often overlooked. In the 1990s, the State of New Mexico developed a regulatory framework (e.g., Mining Act of 1993 and the creation of the Department of Environment in 1991) to address uranium mine remediation and contamination issues.

NMED ensures protection and abatement of groundwater and surface water through enforcement of the groundwater and surface water protection rules in 20.6.2 and 20.6.4 of the New Mexico Administrative Code (NMAC). NMED currently regulates and oversees groundwater quality protection through issuance of groundwater discharge permits in accordance with New Mexico Water Quality Control Commission (NMWQCC) permitting regulations that were promulgated in 1978 pursuant to the New Mexico Water Quality Act. Some of the previously permitted operational mines are undergoing groundwater assessment, abatement, and closure pursuant to NMWQCC regulations. NMED also supports U.S. Environmental Protection Agency, Nuclear Regulatory Commission, and Department of Energy at Superfund and sites maintained under the Uranium Mill Tailings Control Act (UMTRCA).

Since many uranium mines operated prior to the promulgation of environmentally protective federal and state statutes in the 1970s, many sites that were explored or mined were not reclaimed or remediated in accordance with protective regulations, and many were left with no cleanup actions to date. Further, at many of these sites the historical mining company is no longer viable, and thus, there is no longer a responsible party to pursue for cleanup costs. Reclamation and remediation of former uranium mines that are under federal regulatory programs may be performed using responsible party funds (if there is a viable responsible party), financial assurance, and other federal funding sources (such as the CERCLA Superfund). However, prior to HB164, there was no equivalent state program for uranium mines operated prior to the 1970s, as there was no requirement for financial assurance when these mines were in operation. NMED, under House Bill 164 (2022), Section 9-7A-16 NMSA 1978, includes coordination efforts to clean up these 'neglected' uranium mine sites.

Billions of dollars have been invested or secured for investment into uranium cleanup to date, such as $1.7 billion in settlements and enforcement agreements for abandoned uranium mines located on the Navajo Nation and almost $900 million from the Tronox Incorporated (Tronox) settlement for EPA-led cleanup of more than 50 AUMs alone[1]. However, seeing the full impact of this work and addressing all the aspects of uranium mine and mill cleanup will take multiple decades.

Cleaning up legacy contamination from uranium mining and milling is a priority requiring sustained efforts and monitoring, resources, and coordination among all agencies and

[1] EPA uses the term 'AUM' to refer to any uranium mine that is no longer operating, and such sites may still have viable operators that have 'abandoned' operations but are still responsible for cleanup.

stakeholders (e.g., federal, state, and local governments; tribal nations; private landowners; industries; businesses; educational institutions; and impacted communities). While reclamation efforts have been ongoing for some time now, there remains vast amounts of work to be done and a need for sustainable funding, a dedicated workforce, and other resources to continue supporting these efforts.

Mandated by the New Mexico Legislature through HB 164 (2022), this *Strategic Plan* helps NMED lead implementation of the legislation and create a support structure for cleaning up uranium mine and mill sites throughout New Mexico, including timelines for completing cleanup activities at specific sites and anticipated funding requirements. In addition, HB 164 created two full-time uranium mine reclamation coordinator positions: one in NMED and one in the New Mexico Energy, Minerals, and Natural Resources Department (EMNRD), as well as an additional support staff person in NMED. The legislation also established a Uranium Mine Reclamation Revolving Fund (UMRRF) in the State Treasury as a mechanism to receive public and private funds for conducting uranium mine and mill reclamation activities. While not mentioned in HB 164, the New Mexico Office of the State Engineer (NMOSE) is also a necessary partner for groundwater remediation as permits are required for any pump and treat remediation options, and NMOSE regulates issuing well drilling permits and governs licensing water well drillers. The regulations for drilling and plugging wells are covered in 19.27.4 New Mexico Administrative Code (NMAC), requiring NMOSE participation pursuant to the requirements in Title 20 (20.6.2 NMAC).

As part of this established support structure, NMED is tasked to coordinate uranium reclamation efforts with the following agencies and departments:

Cultural Affairs Department

Department of Game and Fish

Department of Health

Department of Transportation

Department of Workforce Solutions

Economic Development Department

Energy, Minerals, and Natural Resources Department

Indian Affairs Department

Office of Natural Resources Trustee

Office of the State Engineer

State Land Office

In addition to coordinating efforts with the agencies and departments listed above, NMED will establish an effective mechanism to engage, consult, and coordinate with the federal government, Indian nations, tribes and pueblos, communities impacted by uranium mining, industries, and other states working on uranium mine and mill reclamation activities and workforce development efforts (see Section VI. Work Plan for more details). NMED will also develop, maintain, and update a centralized repository of uranium mine and mill sites and reclamation activities. More information on these coordination efforts and the Former Uranium Mines and Mills Dashboard (Dashboard; link can be found on the NMED website) is included in later sections of this *Strategic Plan*.

III. Goal 1: Coordinate and Consult with State Agencies, Federal Government, Indian Nations, Tribes, Pueblos, and Impacted Communities on Uranium Cleanup and Report to Legislature Regularly on Progress

A mandated public engagement process exists for reporting on the regulatory actions for permitted former mine and mill sites under reclamation permits. However, while there are baseline requirements for public engagement, there is not a "one-size-fits-all" approach for each of the uniquely regulated sites.

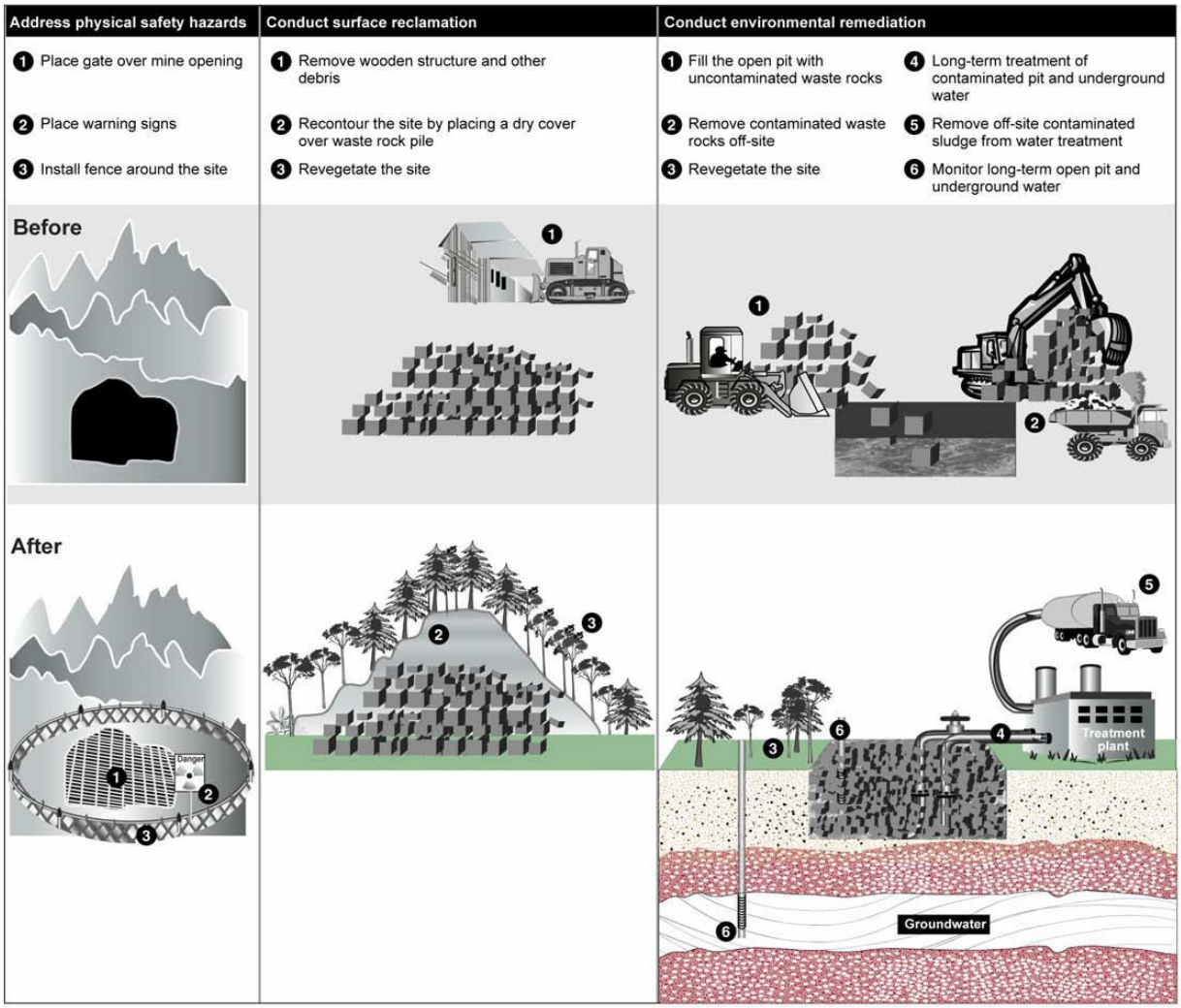
This section provides an overview on what uranium cleanup looks like, the different agency regulatory tracks and overall regulatory landscape affecting permitted uranium mine and mill sites, and example challenges and strategies to address these challenges, including coordinating across agencies and different levels of government. In addition, this section includes former mine and mill site reviews, an overview on AUMs, as well as a description of the *Formerly Operating Mine and Mill Sites Dashboard*.

Overview

According to a 2020 report by the University of New Mexico's Bureau of Business and Economic Research (BBER), a legacy impact of uranium mining is "environmental contamination, including approximately 1,100 former mining, milling, and exploratory drilling sites in northwest New

Mexico, as well as extensive groundwater contamination." Environmental and public health risks include exposure to radioactivity and health-related effects from ingestion of contaminants in groundwater. Cleaning up legacy contamination from uranium mining and milling will require sustained multi-agency efforts, financial resources, and industry partnership. The federal government has, to some extent, taken responsibility to address legacy contamination and protect communities (see Figure 1 below for example uranium cleanup activities). NMED's regulatory role is to hold polluters accountable and oversee the protection of groundwater at former mine and mill sites. EMNRD enforces the New Mexico Mining Act of 1993 to regulate hard rock mining reclamation activities for various minerals. The two state agencies work in conjunction with federal agencies such as the U.S. Environmental Protection Agency (EPA), U.S. Nuclear Regulatory Commission (NRC), and U.S. Department of Energy (DOE) to regulate reclamation, remediation, abatement, discharge permits, and long-term monitoring for mines and mills in New Mexico. In addition to reporting on the status of uranium cleanup under Goal 1, NMED will develop reclamation goals and provide an outline of the proposed approach to meet the goals consistent with the requirements of HB 164. Appendices A and B include additional details on the technical and regulatory aspects of uranium cleanup for former mine and mill sites.

Figure 1. Example uranium cleanup activities (U.S. Government Accountability Office, 2012).



Note: This figure is illustrative and does not include all possible activities that may take place based on site-specific conditions.

According to the EMNRD and NMED *Joint Guidance for the Cleanup and Reclamation of Existing Uranium Mining Operations in New Mexico* (2016), the preferred reclamation methodology and alterative methodology is as follows:

- **The preferred methodology** is to physically remove all radiologically contaminated materials above background value from the site, and to dispose of the material at a monitored disposal facility. These methods likely provide a final site reclamation solution to the responsible party (RP) for unrestricted public use of the site; however, achieving this could require removing a significant amount of materials and natural soils, resulting in potential high costs, adverse environmental impacts, and safety risks to onsite workers.
- **The alternative methodology** includes disposing of unprocessed ore or contaminated waste materials into a no longer operating underground mine (e.g., where unsaturated conditions are likely to persist). In addition, the RP may provide a plan to develop an onsite, incised disposal repository with appropriately designed cover and shallow slopes (i.e., store-and-release/evapotranspiration cover).

For example, one strategy for uranium cleanup is establishing local and/or regional repositories for site waste to avoid the danger of transporting waste material through or to communities. Alternative options would be to install a rail system to transport waste material (high cost), implement in-place burial of waste material (economical where viable), and move waste out of the state to existing facilities where a repository is permitted (labor and transportation intensive, high cost). Having local and/or regional repositories may be the most cost effective and logical strategy since communities do not want waste material on or transported through their communities and this strategy could minimize transportation time on roads. Although there are currently no local or regional repositories identified in the state, preliminary discussions on potential New Mexico sites may present possibilities in the future.

Natural Resource Restoration and Remediation: What Is the Difference?

Although both processes aim to address environmental degradation, the two processes differ in their goals and methods under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Under CERCLA, the New Mexico Office of Natural Resources Trustee's (ONRT) authority is to seek monetary damages from those responsible for natural resource damages, and to use those damages to restore the injured natural resources to baseline condition, or, when that's not possible, to acquire the equivalent thereof.

Natural resource restoration focuses on reverting degraded ecosystems (or injured natural resources) to their original or desired state ("baseline conditions"), typically by enhancing their ecological integrity and functionality. The restoration process often includes 1) assessment, 2) planning, 3) implementation, and 4) monitoring and adaptive management. Reestablishing eroded stream banks degraded by mine drainage is an example of natural resource restoration. A Natural Resource Damage Assessment process assesses the injury to natural resources caused by the release of hazardous substances and seeks compensation for damages from the potentially responsible parties. The assessment often includes a groundwater assessment to ensure potential damage to groundwater is accurately captured. The compensation is used to "restore, replace, or acquire the equivalent of injured, destroyed or lost natural resources and the services they provide." For more information on the Natural Resource Damage Assessment, please visit https://onrt.env.nm.gov/.

Remediation focuses on removing or mitigating negative impacts or risks of pollutants or contaminants from the environment and aiming to restore environmental quality to a level that is deemed safe or acceptable for human health and ecosystems. The remediation process often includes 1) site assessment, 2) remedial investigation, 3) remedial action, and 4) validation and monitoring. Addressing waste from uranium mine sites is an example of remediation.

Sources: (National Oceanic and Atmospheric Administration, 2022; ONRT, n.d.).

Each uranium mine and mill site has their own unique characteristics and physical properties; thus, coordinating agencies will have to evaluate the reclamation and cleanup designs and methods on a case-by-case basis. Even though very few sites have been reclaimed, coordinating agencies have initiated or completed a variety of uranium cleanup efforts ranging from preliminary assessments to full reclamation; however, there is still a lot of work to be done in New Mexico. For example, the NMED Mining Environmental Compliance Section team developed a regulatory track for discharge permits and abatement plans that are 15–20 steps long, each taking months to years to complete. Although coordinating agencies have accomplished a great deal of work to date to move these sites along the regulatory process, strategies to address and technical and regulatory aspects of uranium cleanup in New Mexico will continue to build upon, accelerate, and/or further support current efforts.

Regulatory Landscape and State Regulatory Tracks

The site reviews in this *Strategic Plan* highlight different statuses of the reclamation process. Although the regulatory track and status (including terminology) for each site may be different depending on the overseeing party, jurisdictional boundary, compliance with regulations, and progress of activities, there are general common categories or statuses for uranium reclamation sites (see Figure 2).

Specifically, there is a complex regulatory landscape in New Mexico when it comes to oversight and jurisdictional boundaries of the mine and mill sites. For example:

- NMED enforces the New Mexico Water Quality Act via the Mining Environmental Compliance Section under the Ground Water Quality Bureau
- EMNRD enforces the New Mexico Mining Act via the Mining Act Reclamation Program under the Mining and Minerals Division.
- The New Mexico Department of Game and Fish does not function as a regulatory agency but provides technical guidance for reclamation projects focusing on recommendations for ways to avoid or minimize potential impacts to wildlife during reclamation activities, as well as strategies to improve and enhance wildlife habitat within the reclamation site.
- The New Mexico Historic Preservation Division reviews undertakings in compliance with state cultural property statutes and Section 106 of the National Historic Preservation Act (NMED, 2022).
- The New Mexico Office of Natural Resources Trustee (ONRT) also intersects with

Figure 1. General common categories or statuses for uranium reclamation sites. Adapted from: EPA, 2023b; International Atomic Energy Agency, 2021.

regulatory processes and agencies through cleanup implications on the Natural Resource Damage Assessment process.

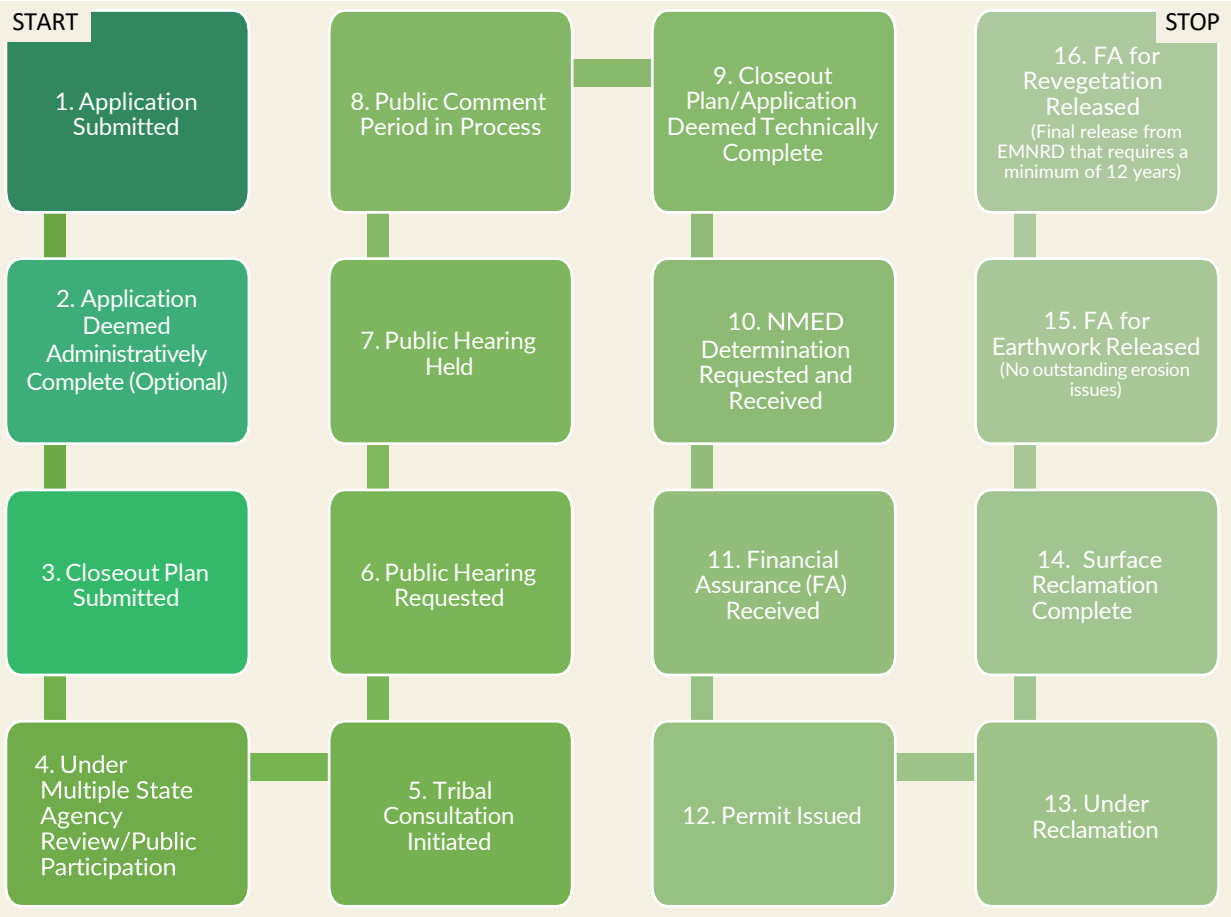
- NMOSE regulates all water well drilling and proper plugging and abandonment of all water wells for the state. By default, NMOSE becomes the institutional control for both state and federal agencies trying to contain contamination or curb the ill effects of deleterious water by instituting well drilling restrictions or prohibitions based on the needs and requests of those controlling agencies. NMOSE depicts those restricted areas on its public-facing map called the OSE Points of Diversion Locations (https://gis.ose.state.nm.us/gisapps/ose_pod_locations/).
- Federal government agencies cover several regulatory aspects of uranium cleanup (NMED, 2022):
    - EPA regulates CERCLA, also referred to as the Superfund Law, oversees the Tronox mines (see more details later in this section) and listed Superfund sites, and implements other CERCLA actions.
    - NRC licenses and oversees the operations of mills, heaps, and in situ leaching mines.
    - The U.S. Department of Energy (DOE) Office of Legacy Management (LM) conducts long-term stewardship, surveillance, and maintenance for cleaned-up uranium sites associated with the legacy of World War II and the Cold War. Most of the legacy effort occurred under the Atomic Energy Commission (AEC), which was abolished by the Energy Reorganization Act of 1974.
    - The U.S. Bureau of Land Management (BLM) administers and enforces regulations and permitting processes related to uranium mining and reclamation on public lands. BLM resides within the U.S. Department of Interior.
    - The U.S. Forest Service (USFS) administers and enforces regulations and permitting processes related to uranium mining and reclamation on national forest lands. USFS resides within the U.S. Department of Agriculture.
- Indian nations, tribes, and pueblos oversee uranium sites on tribal lands and territories, such as the Shiprock Disposal site in Navajo Nation and the Jackpile-Paguate Superfund site in Laguna Pueblo.

As a result of the multiple agencies and partners involved in regulating uranium mine and mill sites in New Mexico, there are also several agency-specific regulatory tracks to follow for each site depending on the ownership and operational history of the site, as well as the land and mineral rights ownership associated with its location. This complex regulatory landscape may increase cleanup timelines.

State of New Mexico Regulatory Tracks

EMNRD's Mining Act Reclamation Program regulatory permit track pertains to surface reclamation of sites and typically includes 16 steps (or statuses; see Figure 3 below). This regulatory track often, but not always, works in parallel to NMED's discharge permit and abatement plan regulatory tracks (see next pages for Figures 4 and 5). For all regulatory tracks, it is important to consult with relevant state agencies early in each process. Site-specific tracks may differ from the generic regulatory tracks presented below.

Figure 3. EMNRD regulatory track for Mining Act Permits.



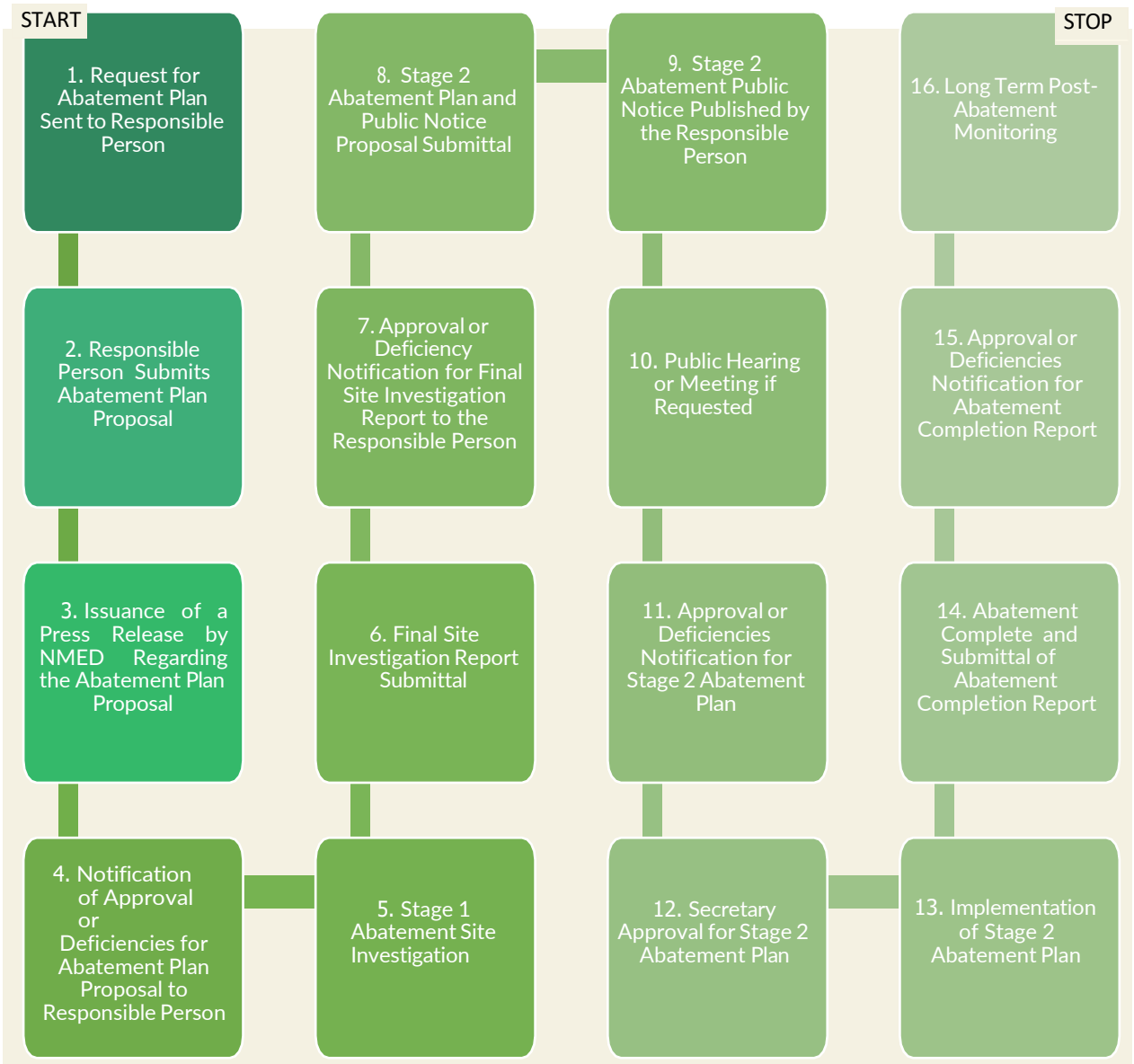
In New Mexico, a site is considered reclaimed when the radiation levels are compliant with 40 Code of Federal Regulations (CFR) 192.12, 40 CFR 192.32 and 10 CFR 40 ("5/15 standard"):

1. Radium-226 concentration in land averaged over any area of 100 square meters does not exceed the background level by more than 1) five picocuries per gram (pCi/g), averaged over the first 15 centimeters of soil below the surface, and 2) 15 pCi/g, averaged over 15-centimeter-thick layers of soil more than 15 centimeters below the surface.
2. Site post-reclamation radiation level for gamma radiation does not exceed the site-specific value of gamma radiation that correlates to five pCi/g of radium-226 above background at the 95th percentile value.
3. For sites where contaminated material exceeds the target radium activity level highlighted above and is placed in an on-site repository, the cover material for the repository achieves radon flux equal or less than 20 pCi per square meter per second.

Other examples of uranium reclamation regulatory tracks that work in parallel to EMNRD's Mining Act regulatory track include NMED's process for abatement plans, which typically includes 16 steps (Figure 4 below) and NMED's process for discharge permits, which includes 12 steps (Figure 5 below). These EMNRD and NMED processes act as the minimum dual regulation for all mine sites in New Mexico (other sites can have EPA, NRC, and other agencies working in

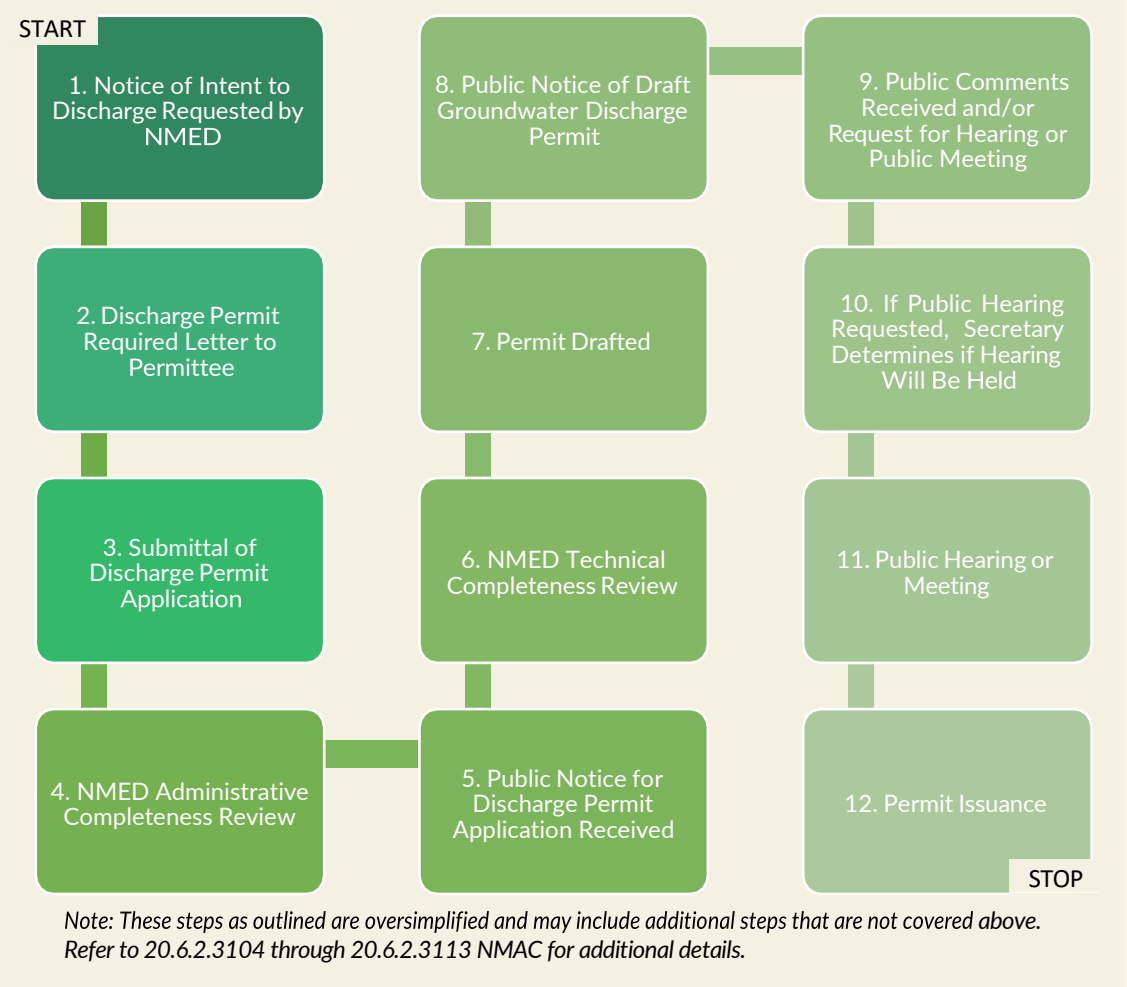
tandem for permitting). Figure 3 above and Figure 4 and Figure 5 below serve as a reference to the mine and mill site reviews discussed later in this section.

Figure 4. NMED regulatory track for abatement plans.



Note: These steps as outlined are oversimplified and may include additional steps that are not covered above. Refer to 20.6.2.4000 through 20.6.2.4115 NMAC for additional details.

Figure 5. NMED regulatory track for discharge permits.



Note: These steps as outlined are oversimplified and may include additional steps that are not covered above. Refer to 20.6.2.3104 through 20.6.2.3113 NMAC for additional details.

While the regulatory tracks at each site may differ from each other, some aspects of the regulatory landscape apply to all permitted uranium mine and mill site operations (past and future) in New Mexico, including:

- As a state, New Mexico relinquished its primacy over the licensing of 11e.(2) material (i.e., tailings or wastes produced by the extraction or concentration of uranium) in 1986. When the licensing returned to NRC's jurisdiction at that point, NMED held its discharge permits for mill sites producing the 11e.(2) material.
- The uranium groundwater standard was five milligrams per liter (mg/L) until 2000. EPA changed the standard due to results found in health-based studies. NMED and EMNRD followed the new standard that was set (EPA, 2022d).
- The AEC announced in 1948 that it would purchase all uranium ore in the United States for a guaranteed price. Under the Energy Reorganization Act of 1974, the AEC was replaced by the NRC and DOE (Buck, 1983).
- Uranium mine waste is not considered a hazardous waste by NMED, EMNRD, or federal standards, which means the Resource Conservation and Recovery Act does not apply.
- CERCLA is a process from the EPA that can exist alongside NMED, EMNRD, and other agency permits. CERCLA meets or exceeds state standards by including them as applicable or relevant and appropriate requirements.

The regulatory functions changed when New Mexico went from being an "Agreement State" to a "Non-Agreement State" in regard to NRC and environmental standards in uranium cleanup that changed over time; for instance, some sites that were reclaimed and released per the standards of the day went back under reclamation when EPA changed standards (NRC, 2023a). However, what remains critical for uranium cleanup to progress is the regular communication and collaboration among federal agencies, tribes, and other state agencies.

Example Challenges and Mitigation Strategies for the Regulatory Environment

Due to the complex regulatory environment, there are several challenges that arise when it comes to uranium mine and mill cleanup efforts, leading to long (e.g., 30^{+} years) cleanup efforts for sites. These challenges encompass the complicated regulations of uranium, civil jurisdictional boundaries, and the role of legacy mining in the pre-environmental regulation era. For example, sites that have previously been reclaimed reverted to the active reclamation stage after certain standards changed. Table 1 describes some of these example challenges, as well as example mitigation strategies to address the challenges. Table 1 is not an exhaustive or complete list but helps to depict some of the challenges faced by regulatory agencies.

Table 1. Example challenges and mitigation strategies for the uranium cleanup regulatory environment.

Example Challenges	Example Mitigation Strategies
Implementation of independent regulatory tracks and processes (e.g., NRC, EPA [Regions 9 and 6], tribal entities, NMED, EMNRD)	• Enhance interagency communication on uranium cleanup efforts. For example: information sharing, lessons learned, and best practices. • Continue to engage in memorandum of agreements (MOAs) where state agencies provide technical support to external regulatory entities to ensure frequent communication and coordination on complex site reclamation.
Staffing shortages due to retirement, turnover, competitive employment landscape, and/or lack of funding leading to slow turnaround on permit process steps and/or public processes	• Coordinate with New Mexico Department of Workforce Solutions (NMDWS) to increase candidate pools when openings are posted on the State Personnel Office website. • Outreach and recruitment at New Mexico schools, job fairs, and conferences. • Promote student internships in industry and at state agencies to create a system to fill vacancies.
Comingled groundwater contamination or surface mine activity across jurisdictional boundaries for AUMs in "checkerboard" areas	• In the forthcoming AUM inventory, add a category for AUM sites with mixed land ownership to aid in identification and cleanup coordination between agencies. • Establish memoranda of understanding or MOAs with applicable agencies to coordinate cleanup standards and practices for AUMs. • Implement water well drilling restrictions or prohibitions where warranted and properly plug and abandon water wells where appropriate.
Split mineral and surface ownership rights can cause land access issues	• Ensure all permits and access rights are in place in the first (preliminary) step of site evaluation (often called pre-screening phase or phase I).

Example Challenges	Example Mitigation Strategies
Use of different mining techniques at AUMs (e.g., open pit, underground, wet or dry mines) leading to variability in mine feature types (e.g., adits, shafts, pits, waste rock piles) that require different levels of cleanup	• Once AUMs on state and private land are inventoried, engage subject matter experts on best practices for cleanup depending on each unique site.
Lack of potential responsible parties for neglected AUMs (for more information, see the AUM section)	• Engage a title company or subject matter expert to evaluate all New Mexico AUMs and identify potential responsible parties that can be brought in for abatement. • Establish a Uranium Mine Cleanup program to clean up neglected AUM sites where a potential Responsible Party cannot be identified.

Understanding current challenges and potential mitigation strategies or solutions to address these challenges is essential to continue the success of current efforts.

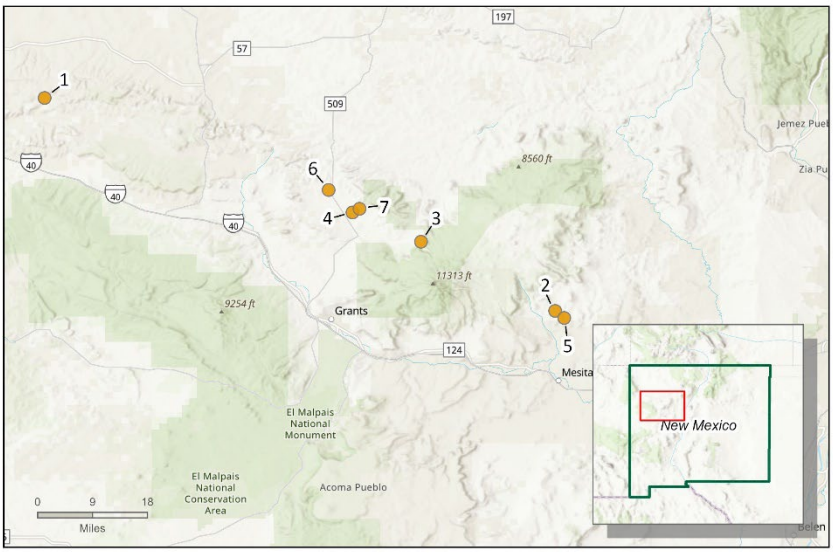
Former Mine Sites: Site Reviews

Appendix A highlights site reviews on seven former mine sites permitted under the New Mexico Mining Act regulations (19.10.3 NMAC) and Water Quality Act regulations (20.6.2 NMAC) related to uranium mine reclamation, as shown in Figure 6 below (see next section on former mill sites). Each site review[1] includes a brief description on the following topics:

- **Location** (description and map)
- **Ownership and history** (including surface and mineral rights)
- **Reclamation and regulatory jurisdiction** (including status and goals)
- **Estimated timelines** for the completion of cleanup activities
- **Coordination** between state and federal agencies
- **Anticipated funding** requirements

[1] Note that site reviews in this report provide the reader with a general history and status of permitted mines and mills. For brevity, they may not provide all relevant details or agency actions related to each site.

Figure 6. Map of seven former mine sites actively under reclamation permits under the New Mexico Mining Act and/or Water Quality Act.



Former Mine Sites

1. Church Rock Mine
2. JJ No. 1 Mine
3. Mount Taylor Mine
4. Rio Algom Mining, LLC (RAML) (Section 17, 22, 24, 30, 30W, 33, 35, 36 Mines)
5. Saint Anthony Mine
6. Section 12 Mine
7. Section 27 Mine

Both NMED and EMNRD play an active and collaborative role in reclamation and remediation for mine and mill sites in New Mexico. The two agencies also help coordinate cleanup efforts with external agencies and other partners that may include a combination of the following, depending on the site: EPA Region 6 and Region 9, Office of Surface Mining Reclamation and Enforcement (OSMRE), DOE, BLM, NRC, USFS, State Land Commissioners, legislators, Indian Nations, tribes, pueblos, non-governmental organizations, permittees, and members of the public. NMED and EMNRD's ongoing efforts focus on ensuring transparency across sectors and leveraging opportunities for collaboration among coordinating agencies to address environmental impacts of legacy uranium activities in New Mexico.

Please refer to Appendix A for the mine site reviews.

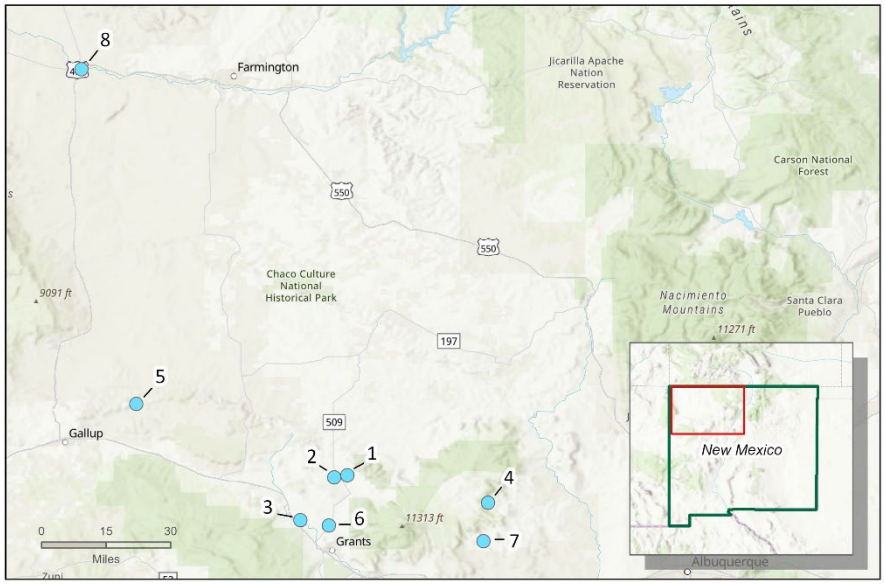
Former Mill Sites: Site Reviews

Appendix B highlights site reviews on eight former mill sites under reclamation or legacy management as showcased in Figure 7 below. Similar to the mine site reviews, each mill site review[2] includes a brief description on the following topics:

- **Location** (description and map)
- **Ownership and history** (including surface and mineral rights)
- **Reclamation and regulatory jurisdiction** (including status and goals)
- **Estimated timelines** for the completion of cleanup activities
- **Coordination** between state and federal agencies
- **Anticipated funding** requirements

[2] Note that site reviews in this report provide the reader with a general history and status of permitted mines and mills. For brevity, they may not provide all relevant details or agency actions related to each site.

Figure 7. Map of eight former mill sites actively under reclamation with NRC or under DOE-LM.



Former Mill Sites

1. Ambrosia Lake Disposal Site
2. Ambrosia Lake West Mill
3. Bluewater Mill
4. Bokum Mill
5. Church Rock Mill
6. Homestake Mill
7. L-Bar Mill
8. Shiprock (Navajo) Mill

Note: Although tribal mining sites are not included in this current Strategic Plan, Shiprock (Navajo) Mill is included in this list and as a site review to show the status of all mill sites in the state. DOE manages the Shiprock site (NMED does not regulate or manage Shiprock).

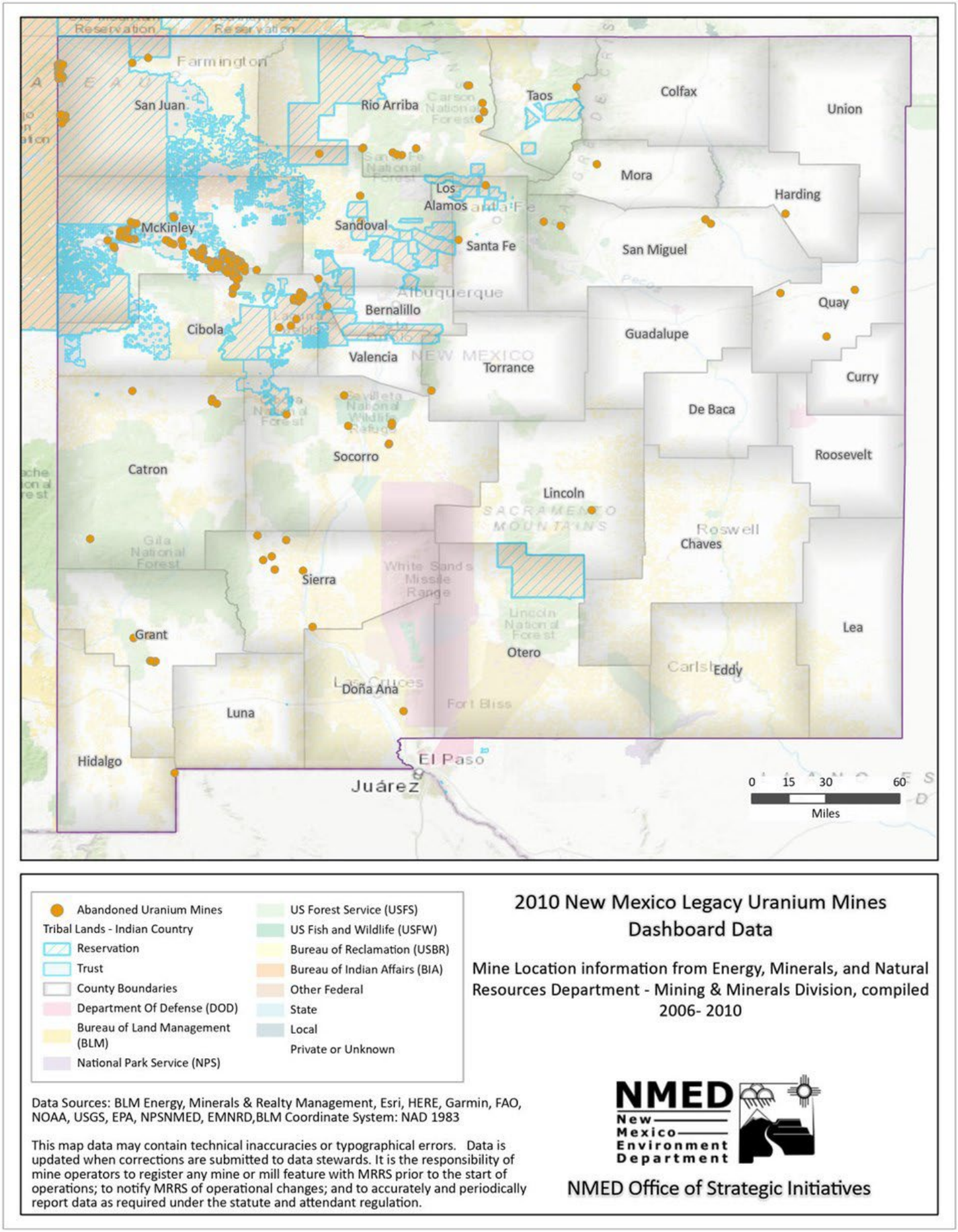
In New Mexico, NRC regulates uranium mill site reclamation and then DOE conducts legacy management of the mill sites. There are only two sites (Homestake Mill and Church Rock Mill) under NMED discharge permits. None of the mill sites are regulated or monitored by EMNRD.

Please refer to Appendix B for the mill site reviews.

Abandoned Uranium Mines

AUMs are known or suspected former uranium mines or mine features that have no identifiable Responsible Party (RP) or potential RP (PRP) associated with the site. There are approximately 250 AUMs in New Mexico on federal, tribal, state, and private lands (EMNRD, 2010; see Figure 8 below). Neglected AUM sites are a subset of AUMs that, in addition to not having an identifiable RP or PRP, do not fall under an existing regulatory or cleanup program (federal, tribal, or state). NMED and EMNRD are in the process of compiling uranium reclamation information in the centralized dashboard, which is an online interactive mapping tool. It will include an inventory of existing AUM locations and, where available, site summary information (see more details in the *Former Uranium Mine and Mill Sites Dashboard* section).

Figure 8. Map of identified formerly operating uranium mine sites in New Mexico from 2010.



Data and Regulatory Gaps

NMED's 2023 *Abandoned Uranium Mines Data Gaps Analysis* report (Appendix C) laid out the key data and regulatory gaps that exist for addressing neglected AUM sites in the state, including:

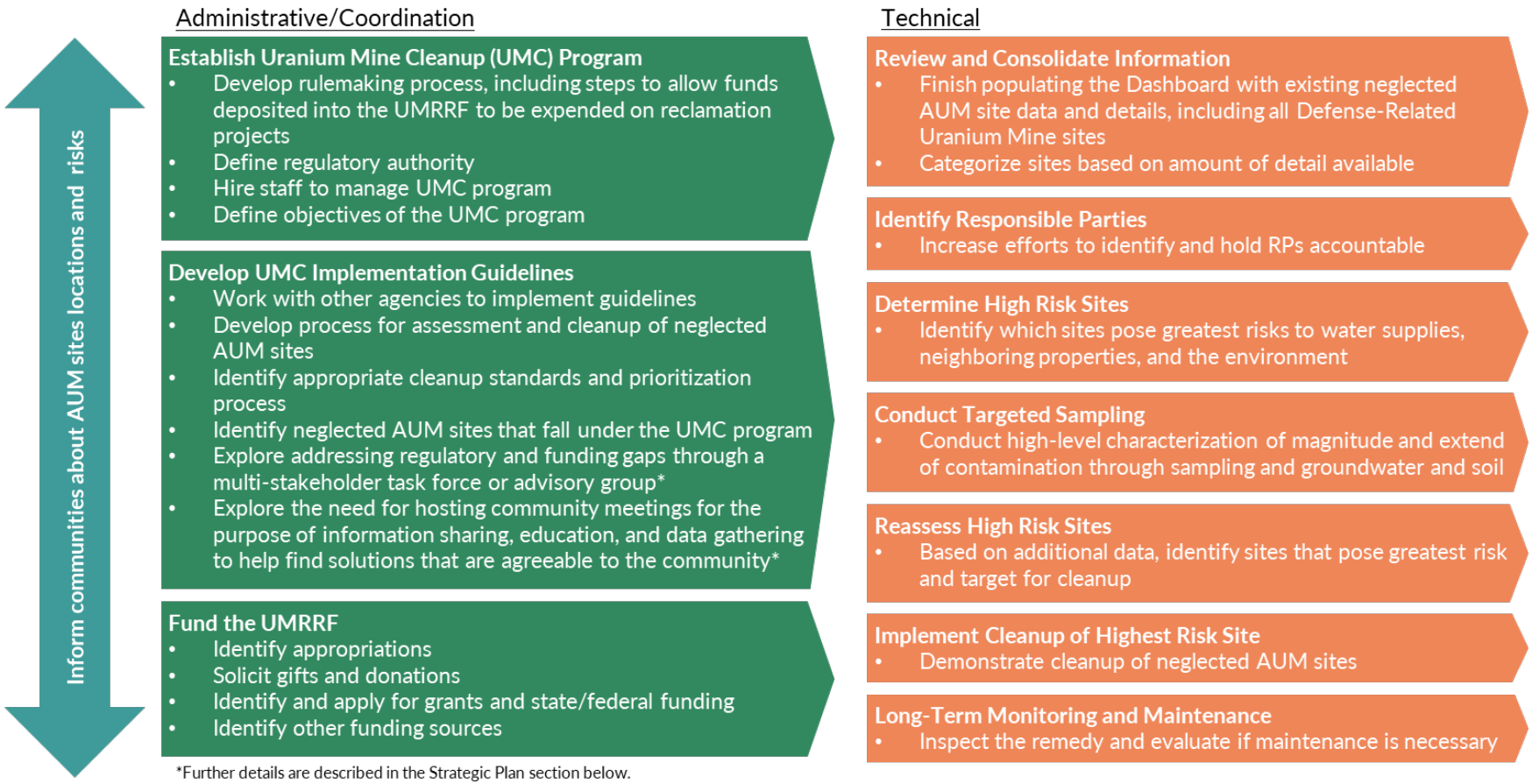
- A complete inventory and review of AUMs so NMED can identify the neglected AUM sites that need to be assessed and cleaned up.
- Comprehensive site assessments to fully characterize the extent of cleanup and funding required to address neglected AUM sites.
- A defined regulatory framework for addressing both surface reclamation and groundwater remediation for neglected AUM sites.
- An AUM regulatory program and staff to administer rules and guidelines associated with assessing and cleaning up neglected AUM sites.
    - **Note:** Current state regulations address requirements for groundwater remediation and surface reclamation, but only when an RP is identified. There is a gap in bringing neglected AUMs with no RP under the state's existing regulatory framework.
- Available funds in the Uranium Mine Reclamation Revolving Fund for cleanup activities.

Recommended actions to address the gaps mentioned above, including establishing a Uranium Mine Cleanup program, developing Uranium Mine Cleanup implementation guidelines, and funding the Uranium Mine Reclamation Revolving Fund (UMRRF), are included in Figure 9 below.

Key Steps to Develop a Neglected AUM Implementation Plan

In addition to addressing the data and regulatory gaps identified above, the state of New Mexico needs a plan to address the neglected AUMs and related corrective actions in New Mexico that includes 1) identifying and prioritizing neglected abandoned mine sites, 2) integrating these sites under a cleanup program, and 3) proposing funding opportunities to support reclamation efforts (refer to the Goal 3: Ensure Sustainable Funding for Strategic Plan Implementation section for more details on funding opportunities). Figure 9 below builds on recommended next steps as identified in NMED's 2023 *Abandoned Uranium Mines Data Gaps Analysis* report (Appendix C), as well as additional exploratory actions further described below.

Figure 9. Recommended next steps for neglected AUM sites in New Mexico (excludes AUMs located on tribal lands and federal lands; source adapted from: NMED, 2023).



Coordinating to Address Neglected AUMs

A multi-stakeholder task force or advisory group could help identify strategies to best address the existing regulatory, data, and funding gaps. Facilitating uranium reclamation efforts across sectors and with coordinating agencies will be critical to neglected AUM cleanup efforts. Proposed roles of the task force could be to:

- **Represent New Mexico's broader community interests** when it comes to uranium reclamation.
- **Share information** to other coordinating agencies on current/planned cleanup efforts underway and raise awareness on opportunities to leverage.
- **Provide strategic advice** to NMED and coordinating agencies on expanding efforts focused on cleaning up potential environmental impacts of legacy uranium mining.
- **Act as an outreach committee** and help disseminate information to the community.
- **Provide input on community engagement activities**, including identifying the most useful meeting structure and content.
- **Help identify needs, areas of alignment, challenges, opportunities, and potential solutions** to address regulatory and funding gaps.

The task force or advisory group would meet on a regular basis (e.g., quarterly, biannually) and members would also be expected to participate in related ad hoc calls, review material (e.g., community meeting agendas), and be active champions in moving uranium cleanup efforts forward in New Mexico.

Raising Community Awareness of AUMs

Hosting community meetings can help educate community members and raise their awareness of ongoing cleanup efforts, as well as providing an opportunity for sharing information and gathering data, all with the goal of finding solutions that are agreeable to the community. Depending on the status of uranium cleanup efforts, the need for regular (e.g., annual, quarterly) community meetings may change, but the overall goal is to ensure communities are well informed and have opportunities to be heard. A proposed approach for these community meetings or other engagement options could be:

1. **Develop a community engagement plan** with community input.
2. **Understand where the affected communities are located** and how those community members prefer to engage (e.g., survey, town hall, focus groups, email newsletters, website).
3. **Consider addressing accessibility factors** (e.g., how limited internet/cellular reception in many impacted communities will be accommodated, how to culturally contextualize shared information).
4. **Build on the annual reports to the Radioactive and Hazardous Materials Committee** and structure meetings to allow for open dialogue with affected communities.
5. **Provide regular updates** on uranium site cleanup status.
6. **Encourage community members to provide input and share feedback and needs** through approaches such as listening sessions or facilitated breakout group discussions.
7. **Create relationships** with the communities and build trust and support.

There are many approaches to engagement, as community members resonate with different parts of uranium reclamation efforts depending on their own life experiences, needs, and interests. Therefore, effective outreach requires special attention, care, sensitivity, and expertise. The multi-stakeholder task force or advisory group described above can help design and structure these community meetings or other engagement methods in an effective way, as well as support outreach for the engagement opportunities with communities.

A Unique Situation: Tronox AUMs

Through the Tronox settlement (see text box for more details), EPA secured around $1 billion to clean up 56 uranium mine sites on or near the Navajo Nation (see Figure 10 below). Because EPA leads the cleanup of mines located on the Navajo Nation, which is outside of State of New Mexico's regulatory jurisdiction, Tronox sites are not specifically reviewed in this report. However, both NMED and EMNRD provide EPA with technical support on some of these sites, including Tronox sites outside of the Navajo Nation, through a Memorandum of Agreement (MOA). NMED is the lead on the MOA and distributes funds to EMNRD for its work.

Overview of the Tronox Settlement (from NMED's 2023 *Abandoned Uranium Mines Data Gaps Analysis* report)

In 2014, more than $5 billion was recovered from litigation settlements with Kerr-McGee Corporation and its spinoff, Tronox, to provide EPA with funds to assess and clean up contaminated sites across the country, including nearly $1 billion to clean up approximately 50 uranium mines formerly owned by Kerr-McGee Corporation on or near Navajo Nation lands. The Kerr-McGee Corporation mined more than seven million tons of uranium ore from the mines in New Mexico and around Navajo Nation lands from the 1940s through the 1980s. Approximately $45 million was allocated to the Navajo Nation to address the Shiprock uranium mill site. EPA received almost $90 million for the Quivira mine sites. The remaining funds are mandated to be spent on addressing contamination at other uranium mine sites listed in the Tronox settlement, including 34 mines in EPA Region 9 and 20 mines in EPA Region 6 in New Mexico. Because the Tronox mine sites have an RP, they are not considered neglected AUMs.

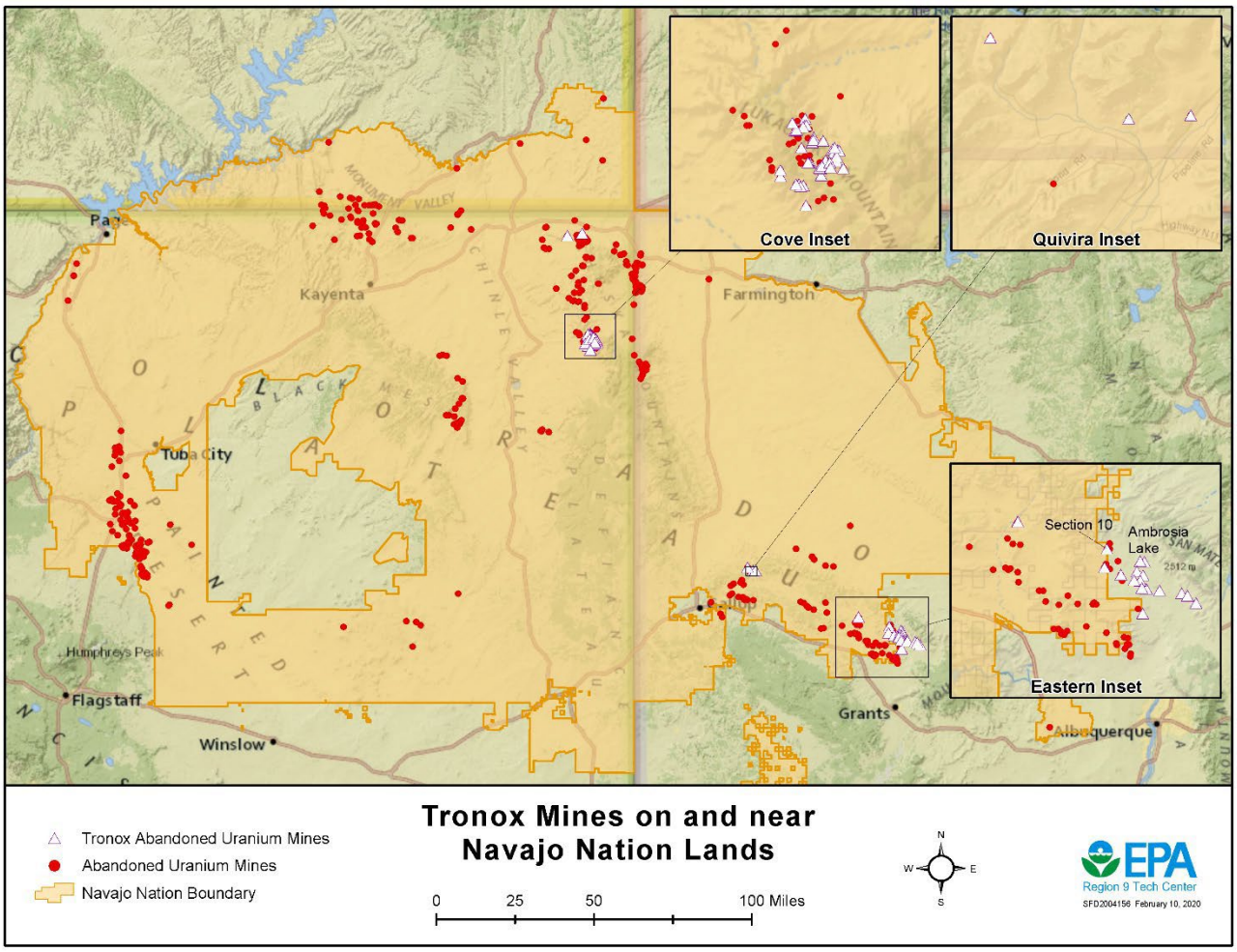
Sources: (EPA, 2016; EPA, 2022a; EPA, 2022c, NMED, 2023).

This settlement has direct and indirect impacts on New Mexico's economy. For example, the funding:

- Supports infrastructure upgrades to access the sites.
- Provides management and field personnel for cleanup efforts.
- Supports training and capacity in remediation studies (workforce development).
- Could set precedents that inform future, larger scale uranium mine remediation decisions in New Mexico.

The BBER (2020) report further describes different scenarios and outputs on in-state economic impacts from this $1 billion settlement. Strengthening the state's economy and ensuring the investments build capacity of in-state businesses will require workforce development (as noted in HB 164) and pathways for greater innovation and collaboration in New Mexico. See Goal 2: Develop a Workforce Supporting Uranium Mine and Mill Reclamation section for more information on preliminary workforce development initiatives.

Figure 10. Tronox mines on and near Navajo Nation lands (EPA, 2023f).



Former Uranium Mine and Mill Sites Dashboard

NMED, in partnership with EMNRD, initiated the creation of an interactive web mapping tool to increase information access on the reclamation status of formerly operating uranium mine and mill sites across New Mexico. This Dashboard summarizes mine and mill site information, provides any relevant regulatory action under the two agencies' permitting tracks, and displays information for all other sites where available.

The information is overlain with land ownership information, legislative districts, mining district boundaries, and other helpful contextual layers that can be toggled on and off.

Table 2 below highlights the current or planned Dashboard data updates.

Table 2. Former Uranium Mines and Mills Dashboard data updates.

Data Update Action and Description
Action: **An update to EMNRD's 2011 Legacy Uranium Mines Dashboard data compiled between 2005 and 2010**.
• **Defense-Related Uranium Mine (DRUM) data update.** AUM data will be updated based on DOE's DRUM program data currently in progress. The Dashboard will include available data as soon as it is made accessible. DRUM data is limited to records held by the AEC for uranium purchases over 2,000 pounds (note that the AEC was abolished in 1974). The DRUM program produces Validation and Verification (V&V) reports for each site in New Mexico and other states where AEC records existed. V&V reports for sites on federal lands (USFS, BLM, Trust Land) are complete for New Mexico. The New Mexico state and private land data collection is expected to be completed by the end of 2023, with V&V reports completed in 2024. • **Tronox data update.** Sites included in the Tronox Bankruptcy Settlement case will be updated to note Tronox, now bankrupted, as an RP. However, EPA leads the cleanup under the settlement agreement (see the Unique Situation: Tronox AUMs section). The settlement included approximately 80 AUMs on federal, Navajo Nation, and state lands within the boundary of New Mexico. • **Neglected AUMs.** AUM sites that have no identified potential RP and do not fall under a state or federal cleanup program are considered neglected AUMs. These sites will need to be addressed by a forthcoming NMED-led uranium mine cleanup program (see the Abandoned Uranium Mines section). • For mine sites where a V&V report is not available, a pre–Comprehensive Environmental Response, Compensation, and Liability Information System report will be linked, if available.
Action: **Addition of mine sites regulated, in part or in whole, by the State of New Mexico.**
• For mine sites permitted through EMNRD and NMED, the Dashboard will include a link to a webpage with up-to-date site reviews, including the associated regulatory tracks and statuses of surface reclamation (Mining Act), discharge permits, and abatement plans (Clean Water Act). Sites on tribal lands and territories, or otherwise not regulated by state agencies, will display basic site information but may not have an associated site summary link.
Action: **Addition of mill sites.**
• The NRC is the lead regulating agency for all mill sites and sites where the beneficiation of uranium was conducted. There are no active mill sites in New Mexico. Once a former mill site meets NRC criteria, it is transferred to DOE-LM under the authority of Uranium Mill Tailings Radiation Control Act Title II for long-term care. The Dashboard will include a link to the mill site reviews that are included in this report for context and completeness but do not fall under state regulatory jurisdiction. • Generally, NMED and EMNRD do not regulate active or decommissioned mill sites. However, there are two exceptions where NMED manages a discharge permit at the former Homestake Mill (NRC, 2022), and the former Ambrosia Lake West Mill (NRC, 2023b). These discharge permits are managed separately from NRC and DOE oversight.

Data on the Dashboard, including the cleanup status of all sites, will be updated as applicable and on an ongoing basis (link can be found on the NMED website).

IV. Goal 2: Develop a Workforce Supporting Uranium Mine and Mill Reclamation

New Mexico must reposition and expand its workforce to support environmental cleanup as a growing industry. The BBER (2020) report estimates 1,000 jobs can be created for every $1 billion spent on uranium cleanup projects. Because cleanup efforts include assessments, safeguarding, surface reclamation, and potential groundwater remediation, continued demand for workers will likely endure for decades. Environmental cleanup requires a wide range of professionals who possess specialized skills to support the technical and physical aspects of cleanup. Due to the diversity of expertise, the reclamation industry can provide stable job opportunities for a vast number of New Mexicans. Targeting environmental cleanup as an economic industry can also diversify employment opportunities in regions that may be dependent on industries negatively impacted by recent energy transition initiatives at the state and federal levels.

As a result of HB 164 (New Mexico Legislature, 2022), uranium mine and mill reclamation is an officially recognized target industry in New Mexico. The bill also calls for creating, coordinating, and promoting worker training and business development programs in collaboration with the New Mexico Economic Development Department (EDD; e.g., via the Job Training Incentive Program), New Mexico Department of Workforce Solutions (NMDWS), and industry partners. As the lead agency of the bill's implementation, NMED interprets "reclamation" in HB 164 to mean environmental cleanup of air, land, surface water, and groundwater to protect resources and public health and safety, which is in line with NMED's stated mission.

This section of the *Strategic Plan* provides examples of the existing landscape of reclamation workforce development initiatives in the United States, potential obstacles New Mexico may face in developing a reclamation workforce, and opportunities to maintain and grow a resilient uranium reclamation industry. Through collaborating with tribal nations (following the New Mexico State Tribal Collaboration Act), educational institutions, government agencies, industry businesses, and local nonprofits, New Mexico has an opportunity to position itself as a leader in uranium reclamation outreach and engagement, training, and workforce development.

Existing Landscape of Reclamation Workforce Development Initiatives

Existing Workforce in New Mexico

NMDWS's Economic Research and Analysis Bureau completed a skills-matching report in June 2022 to evaluate the ability of New Mexico's workforce to carry out cleanup and remediation work (Appendix D). According to the report, New Mexico had nearly 53,000 workers employed in uranium mine cleanup and remediation-related occupations in 2022. By 2030, the professional, scientific, and technical services industry is expected to grow by 11.96 percent and the waste management and remediation services industry is expected to grow by 13.27 percent. As of May 2023, NMDWS estimates approximately 2,500 New Mexicans could feasibly begin cleanup and remediation work, which includes unemployed workers and higher education graduates with skills related to cleanup and remediation occupations.

Other Reclamation Initiatives in the United States

Throughout the country, entities are initiating worker training and business development programs to support reclamation. The text boxes below highlight examples from the Colorado

Division of Reclamation, Mining, and Safety; the Navajo Nation; and Florida International University (FIU).

Colorado Division of Reclamation, Mining, and Safety

The Colorado Division of Reclamation, Mining, and Safety administers the Inactive Mine Reclamation Program (IMRP) to address hazardous and environmental issues associated with abandoned or inactive "legacy" mines. IMRP provides a variety of workforce development and learning opportunities throughout Colorado. For example, in 2022, IMRP:

- **Hired students and college interns** to assist with file scanning, project development, and office duties.
- **Partnered with Environmental Learning for Kids**, a local nonprofit, to provide under-engaged students with mentorship, leadership development, and science education in revegetation, wetland restoration, and water sampling.
- **Partnered with Colorado Correctional Industries** to train individuals who are incarcerated on safeguarding abandoned mines.
- **Partnered with Colorado Youth Corps Association** to provide youth, young adults, and military veterans with technical training and work experience on land, water, and energy projects.
- **Provided Boy and Girl Scout troops** service opportunities related to abandoned mine land reclamation.

Source: (OSMRE, 2022).

The Navajo Nation

The Navajo Nation utilizes partnerships, federal contracts, and training programs to support uranium reclamation workforce development. From 2008–2019, EPA awarded over $7.85 million in contracts to Navajo-owned businesses for projects, including for soil excavation and road and bridge construction. During this period, over 200 jobs were provided to Navajo workers and over 30 students completed internships studying uranium issues. EPA's Superfund Job Training Initiative has also trained 19 Navajo community members.

From 2012–2016, the Navajo Nation Environmental Protection Agency partnered with the Northern Arizona University Institute for Tribal Environmental Professionals to provide community members training on hazardous waste operations, occupational safety, and radiation hazards. In 2017, EPA awarded Tetra Tech, Inc., the Response, Assessment, and Evaluation Services (RAES) contact to address public health and environmental risks from abandoned mines on Navajo land. The contract promoted economic development, employment, and training opportunities for Navajo members. For example, Tetra Tech partnered with Navajo Technical University and local businesses to train Navajo community members in assessment and cleanup. The EPA recently awarded Tetra Tech a second Navajo RAES contract of $65 million to continue these efforts.

Source: (EPA, 2021).

Florida International University

FIU is the largest Hispanic-serving educational institution in the continental United States. The DOE Office of Environmental Management partners with FIU to provide funding and sponsorship to minority students in the field of environmental cleanup. The fellowship and workforce development program includes mentorship, training, research, and professional development opportunities. The program also helps create a DOE reclamation career pipeline. Students selected as DOE Fellows receive a paid DOE summer internship and paid research assistantship at FIU's Applied Research Center. Graduate fellowship students also receive a tuition waiver. From 1995–2006, the Fellows Program trained 824 FIU students.

Source: (FIU, n.d.).

Potential Obstacles in Developing a Reclamation Workforce

According to data from NMDWS's annual State of the Workforce Report, New Mexico may face several challenges related to the supply of workers (NMDWS, 2022). From 2010–2021, the state had a net negative in worker migration, meaning more people left New Mexico for employment than the number of people who moved to New Mexico for employment. The fastest growing population group in New Mexico is people of retirement age. Additionally, New Mexico's earnings and household incomes are lower than the national average. As of 2020, New Mexico's median annual earning was 16 percent less than national earnings. As of 2020, New Mexico's median household income was over $13,000 less than the national median household income.

The BBER (2020) report also identifies potential workforce development obstacles in the state, including:

- Inability for the state to mobilize an adequately trained workforce due to inconsistent reclamation work and a lack of workers with specialized certifications.
- Non-competitive wages in rural New Mexico with less amenities than metropolitan areas to attract workers.
- Remote area job site constraints, which could include a lack of cellular coverage, difficult terrain near mine sites, and long transportation times to and from work.

The following section provides recommendations to mitigate some of these obstacles, along with additional areas of opportunity.

Opportunities to Maintain and Grow a Uranium Reclamation Industry

There are several strategies to help maintain and grow a reclamation workforce in New Mexico. Identifying key partners and coordinating agencies, establishing working relations, and defining clear roles and responsibilities will be an essential first step in developing the workforce. Long-term collaboration with these partners and coordinating agencies will promote workforce benefits throughout New Mexico and help maintain a qualified workforce that can support enduring reclamation efforts.

Strategic opportunities include:

1. Create specialized training initiatives for qualified workers and expand certifications and vocational programs for workers without college degrees.
2. Administer internships and worker placement initiatives in collaboration with state agencies, tribal nations, and educational institutions.
3. Engage and educate communities on reclamation career pathways, trainings, and certificate programs.
4. Provide support to local businesses through technical assistance and resources.
5. Apply for workforce development public and private funding opportunities.

The following tables provide example activities for the above strategies drawing upon BBER (2020) recommendations and other states' reclamation workforce initiatives. Implementing these recommendations will require collaboration and coordination among many partners and coordinating agencies, including NMED, NMDWS, EMNRD, EDD, higher education institutions, small businesses, and industry partners.

Table 3. Workforce development recommendation #1.

Recommendation 1: Create specialized training initiatives for qualified workers and expand certifications and vocational programs for workers without college degrees	
Example Activity	***Description***
Expand certifications, on- the-job trainings, vocational programs, and other non-college-degree opportunities	There are various occupations in the reclamation industry that do not require a college degree, such as construction laborers, hazardous materials removal workers, and industrial truck and tractor operators. NMDWS (2022) estimates approximately half of the occupational groups who perform cleanup and reclamation work typically do not require an associate degree or higher. Increasing certification or professional training opportunities in these areas can increase the reclamation labor pool and provide non-college-educated individuals additional employment opportunities in the state. NMED, NMDWS, EDD, higher education institutions, and industry employers can coordinate to promote a weeks-long, employer-led training program and other high-quality and consistent education and training programs. Creating and piloting an industry-specific job training program for reclamation activities could increase the number of workers in the reclamation industry, bring down the overall cost of reclamation, and expand employment opportunities in the state.
Provide specialized Occupational Safety and Health Administration (OSHA) trainings	Uranium reclamation workers must have specialized OSHA trainings due to the presence of hazardous and radioactive substances. The costs associated with providing such trainings are often too expensive for universities or employers to maintain (BBER, 2020). Coordinating a state-led OSHA program can increase workers' access to the specialized training required for reclamation work, ensuring the state has an adequately trained workforce available to address reclamation needs. There are state agencies that may already be well positioned to provide specialized OSHA trainings, such as the Bureau of Mine Safety. The OSHA training most often required to work in the field is the 40-hour Hazardous Waste Operations certification.
Retrain and reskill former mining industry workers	Former uranium mining workers often have skills that are transferable to environmental reclamation work such as hazard assessment and heavy equipment operations. Retraining builds upon these existing skills to develop a reclamation workforce with local expertise. As active uranium mining operations have ceased in New Mexico, retraining former mining workers in reclamation can provide workers with new skills and job opportunities in a growing industry.
Utilize Workforce Innovation and Opportunity Act (WIOA) funding	WIOA is a program funded by the U.S. Department of Labor to help dislocated workers and other adults access employment, education, training, and support services to succeed in the labor market. NMED is currently supporting an initiative by San Juan College to develop employer-led environmental reclamation training using WIOA funding and any support services.

Utilize Energy Transition Act (ETA) funding	The Energy Transition Act (ETA) Displaced Worker Assistance Fund was established for New Mexico residents who are terminated from employment, or whose contract was terminated due to the abandonment of a New Mexico facility producing electricity that resulted in the displacement of at least 40 workers. Eligibility requirements need to be met to receive funding for Job Training under the provisions of the ETA.

Table 4. Workforce development recommendation #2.

Recommendation 2: Administer internships and worker placement initiatives in collaboration with state agencies, tribal nations, and education institutions	
Example Activity	***Description***
Identify vacancies in NMED's Ground Water Quality Bureau and Mining Environmental Compliance Section	NMED's Ground Water Quality Bureau and Mining Environmental Compliance Section provide essential support for reclamation activities in the state. NMED's Surface Water Quality Bureau and the Remedial Oversight Section also support uranium reclamation permitting activities. Identifying and filling vacancies in these units will help ensure NMED can fulfil its regulatory duties to protect New Mexico's health and the environment. NMDWS and NMED can collaborate to recruit for these positions.
Increase internship opportunities at state agencies	State government internships can provide local students with industry insights, hands-on experience, and professional development opportunities in reclamation work. Internships can also help the state recruit qualified students for permanent positions. Internship opportunities in reclamation may range from technical to administrative work. The Colorado IMRP, for example, hires summer interns to assist with water sampling, project development, file management, and other office duties (OSMRE, 2022). Collaborating with educational institutions will help the state advertise and recruit qualified students for the positions. These institutions include but are not limited to: • Central New Mexico Community College • Navajo Technical University • New Mexico State University Grants • New Mexico Tech: New Mexico Bureau of Geology & Mineral Resources • San Juan College • University of New Mexico
Promote existing federal internship programs	Various federal agencies have programs that provide hands-on experience for students pursuing a career in environmental remediation. For example, as part of the Mentorship for Environmental Scholars (MES) Program, undergraduate students interested in environmental monitoring and remediation participate in summer internships at DOE sites, including Los Alamos National Lab in New Mexico. Applicants for the MES Program must be attending an accredited Minority Institution, be a member of an underrepresented group, and be pursuing a degree in science, technology, engineering, and mathematics (STEM); political science; business administration; or public administration (Pre-College University, n.d.). Utilizing such programs can increase diversity in the reclamation field and potentially attract qualified students to New Mexico.

Table 5. Workforce development recommendation #3.

Recommendation 3: Engage and educate communities on reclamation career pathways, trainings, and certificate programs	
Example Activity	***Description***
Advertise opportunities through existing communication channels	Using New Mexico Workforce Connection, LinkedIn, social media, radio, and television can help advertise professional development and training opportunities and increase awareness about the reclamation industry in New Mexico.
Attend job fairs, present to classrooms, and host field trips	Attending university and community events can increase interest and awareness about careers in reclamation. Colorado IMRP, for example, offers field trips to abandoned hard rock and coal mine reclamation sites for university students in environmental sustainability programs (OSMRE, 2022).
Present at water, engineering, transportation, mining, and other reclamation-related conferences	Presenting at conferences can help target specific employment markets. Below is a list of state and national organizations, as examples, which have related conferences and exhibitions: • American Ground Water Trust • American Water Works Association • Commercial Vehicle Safety Alliance • National Center for Construction and Research • National Groundwater Association • New Mexico Mining Association • Northern Arizona University Institute for Tribal Environmental Professionals

Table 6. Workforce development recommendation #4.

Recommendation 4: Provide support to local businesses through technical assistance and resources	
Example Activity	***Description***
Establish a specialized resource center for small businesses	The BBER (2020) recommends the state establish a specialized small business assistance center to support local reclamation businesses seeking to apply for environmental reclamation subcontracts. Example business center activities would include: • Maintaining a list of contracting opportunities. • Assisting with federal contract paperwork and certification processes. • Hosting workshops on available resources and how to apply. Explore developing a plan to establish a specialized resource center for environmental remediation small businesses. Coordinate and promote other business development programs to help local businesses and entrepreneurs gain access to resources and succeed at cleanup activities.

Recommendation 4: Provide support to local businesses through technical assistance and resources	
Maintain a reclamation networking platform that refers candidates to environmental employers	According to the BBER (2020), the state lacks a networking and communication platform for businesses to find workers and for job seekers to find opportunities that align with their qualifications. Further, there is limited information about uranium reclamation job requirements and skills (online and through other avenues such as job fairs), and the state does not adequately communicate professional development opportunities to educational institutions. As such, qualified students often leave the state for employment opportunities elsewhere. Developing and maintaining a reclamation worker networking initiative will help match local professionals with local reclamation businesses to recruit and retain qualified workers in state.
Promote the Job Training Incentive Program	The EDD administers the Job Training Incentive Program to fund training for newly created jobs in expanding or relocating businesses. The program funds three types of training: classroom training, structured on-the-job training, or a combination of classroom and on-the-job training. Eligible businesses include companies that produce a product in New Mexico, non-retail service companies that export a substantial percentage of services out of state, and certain green industries. The program reimburses 50–85 percent of employee wages for six months (EDD, n.d.).

Table 7. Workforce development recommendation #5.

Recommendation 5: Apply for workforce development public and private funding opportunities	
Example Activity	***Description***
Apply for public and private workforce development funding opportunities	Various public and private funding opportunities exist to support workforce development, including job training, educational programming, and entrepreneurship. Section V below provides more information on potential workforce development funding sources for reclamation.

V. Goal 3: Ensure Sustainable Funding for Strategic Plan Implementation

Substantial financial resources are necessary to ensure NMED has the equipment, expertise, and facilities required for uranium mine reclamation. The costs for cleanups are high due to the complex nature of reclamation, including site assessment, remediation activities, long-term monitoring, and occupational safety. Further challenges exist in funding uranium mine reclamation when there is no Responsible Party (RP), meaning there is no viable entity liable for the financial costs of cleanup.

Leveraging private and public funds will be essential in securing long-term funding for cleanup activities. Several federal agencies provide funding for uranium mine reclamation projects, including EPA, DOE, and the U.S. Department of the Interior (DOI). Public and private funding opportunities also exist for developing a uranium mine reclamation workforce.

Uranium Mine Reclamation Revolving Fund

HB 164 (New Mexico Legislature, 2022) established the Uranium Mine Reclamation Revolving Fund (UMRRF) in the State Treasury as a mechanism to receive public and private funds for conducting uranium mine and mill reclamation activities. The UMRRF consists of funds that NMED and EMNRD receive from federal and state appropriations, gifts, grants, donations, and settlements.

NMED will administer the UMRRF, subject to legislative appropriation through the annual budgeting process. NMED may use appropriated funds for planning, supervising, and completing mine reclamation projects, including the acquisition of tools and equipment. NMED may also use funds for litigation expenses involving uranium mine sites. NMED may not use funds for department operational expenses. Unused funds will not revert to the general fund at the end of each fiscal year (June 30). Currently, there are no funds in the UMRRF.

The following activities may assist NMED in developing an investment framework and establishing project funds:

- **Establish a procedure for distributing funds** from the UMRRF, including developing a funding request application, selection and scoring criteria for prioritizing fund distribution, and a review panel to assess funding requests.
- **Collaborate with ONRT** and other coordinating agencies to leverage existing and upcoming efforts, including building on existing defined processes and procedures.
- **Track current and prospective state litigation** for potential monetary awards related to uranium mine reclamation that may be awarded to the state.
- **Apply to public and private funding** opportunities (see next section).

Funding Opportunities

In Summer 2023, NMED conducted web-based research to identify an initial list of 12 funding opportunities related to workforce development and cleanup activities (see Appendix E for more details). The funding opportunity spreadsheet provides information on the identified funding source, topic, award amount, award timeframe, eligibility, cost share requirement, application timeframe, and contact information. Below is a summary of the findings.

Prospective Funding

On March 30, 2023, Senators Shelley Moore Capito (R-WV), Tom Carper (D-DE) and Sheldon Whitehouse (D-RI) introduced Senate Bill 1111 (S. 1111), the Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act, or ADVANCE Act, of which Senator Martin Heinrich (D-NM) is a cosponsor (118th U.S. Congress, 2023).

Federal funding opportunities include workforce development and hazardous waste management. At the time of this funding research, workforce development opportunities appear to provide the broadest range of funding, including for:

- Developing occupational safety and health education research centers.
- Improving hazardous materials inspector training.
- Recruiting and training underemployed residents of communities impacted by hazardous waste, specifically those impacted by the energy transition (e.g., closing of the San Juan and Escalante Generating Stations).
- Implementing STEM work-based learning models. ('STEM' refers to science, technology, engineering and math).
- Advancing informal STEM learning experiences for public audiences.

Hazardous waste management funding includes a program for improving hazardous material shipper inspection compliance. Future collaboration with tribal nations may yield greater opportunities for hazardous waste management funding. For example, EPA issues the Hazardous Waste Management Grant Program for Tribes, which provides financial assistance to tribal governments for developing and implementing hazardous waste programs (EPA, 2022b). The U.S. Department of Transportation (DOT) issues the Tribal Transportation Program Safety Fund, which includes funding for transportation safety plans and infrastructure improvements through fiscal year 2026 (DOT, 2023b).

EPA's Brownfields Program offers a variety of funding opportunities for Brownfields assessment, cleanup, job training, and research (EPA, 2023a). However, Superfund sites are not eligible for Brownfields cleanup programs, and sites must have a reuse purpose that benefits a wider community, thus eliminating many remote sites in New Mexico. Two Brownfields programs support uranium activities: 1) the Job Training Grant and 2) the Multipurpose, Assessment, Revolving Loan Fund, and Cleanup Grant. NMED can continue to monitor EPA's Brownfields Program for announcements of annual grants, which support reclaiming uranium mines and mine-scarred lands.

NMED may also leverage funding from EPA Research Grants, which support research and projects related to environmental protection, public health, and sustainability. Air Research Grants fund research addressing public health and environmental impacts of air pollution. Water Research Grants fund research for ensuring water quality (EPA, 2023d).

The Bipartisan Infrastructure Law (BIL) was enacted on November 15, 2021, and appropriated over $21 billion in environmental remediation efforts to address legacy pollution (The White House, 2023a). To date, there is no direct mechanism to fund uranium mine site cleanup, though funding through the Clean Water State Revolving Fund may apply to AUM cleanup in the future. NMED may use the following webpages to monitor upcoming BIL funding opportunities that may be relevant to uranium mine reclamation efforts:

- DOT Key Notices of BIL and Inflation Reduction Act Funding (DOT, 2023a)
- EPA Upcoming BIL and Inflation Reduction Act Funding (EPA, 2023c)
- White House BIL Funding Opportunities (The White House, 2023b)

NMED's "Abandoned Uranium Mines Data Gap Analysis" report (2023) identifies additional state and federal programs that can provide funding to support cleaning up contaminated sites, along with challenges in funding AUM sites under these programs (Appendix C).

Table 8 provides a list of federal agencies and programs that may provide funding opportunities related to AUM reclamation and workforce development. See Appendix E for a list of specific funding opportunities that are currently available within these agencies and programs.

Table 8. List of federal agencies that may support reclamation and workforce development.

Federal Agency	AUM Reclamation	Workforce Development
Centers for Disease Control and Prevention (CDC) • National Institute for Occupational Safety and Health (CDC, 2023)		✓

Federal Agency	AUM Reclamation	Workforce Development
Department of Commerce • Public Works Program (U.S. Economic Development Administration [EDA], n.d.-a) • Economic Adjustment Assistance Program (EDA, n.d.-b)		✓
Department of Energy (DOE) • Defense-Related Uranium Mines (DRUM) Program (DOE, n.d.)	✓	
Department of Housing and Urban Development (HUD) • Community Development Block Grant Program (HUD, 2022).		✓
Department of Labor (DOL) • Employment and Training Administration (DOL, n.d.)		✓
Department of the Interior (DOI) • Bureau of Land Management Abandoned Mine Lands (AML) Program (DOI, n.d.). • Abandoned Hardrock Mine Reclamation (AHMR) Program (DOI, 2024)	✓	
Department of Transportation (DOT) • Pipeline and Hazardous Materials Safety Administration (DOT, n.d.).		✓
Environmental Protection Agency (EPA) • Brownfields Program (EPA, 2023a) • Superfund Program (EPA, 2023e)	✓	
National Science Foundation (NSF) • Directorate for STEM Education (NSF, n.d.)		✓
U.S. Department of Agriculture • Forest Service AML Program (USFS, n.d.).	✓	

Private foundations provide another opportunity for funding uranium mine cleanup activities in New Mexico. The Mott Foundation provides grants in the areas of youth education and career development, and the McCune Charitable Foundation provides funding to expand economic development in New Mexico. The primary challenge in securing private funds is ensuring state government entities are eligible applicants. However, collaborating with higher education institutions, nonprofit organizations, and local businesses can increase eligibility opportunities for private funding.

VI. Work Plan

As a living guide to expand efforts focused on cleaning up the environmental impacts of legacy uranium mining in New Mexico, this *Strategic Plan* is meant to be updated as social, political, regulatory, and economic changes occur. To support initial implementation of this *Strategic Plan* and make progress toward the three goals, Table 9 highlights the following categories organized by goals:

- **Recommended Activities.** Specific, measurable, achievable, relevant, and time- bound—or SMART—outputs or milestones that can help achieve the overall goal given available resources.
- **Outcome.** Achievements or results that can be measured in terms of changes in behavior, experience, knowledge, skills, services, policy, or environmental health.
- **Timeframe.**
  - Short-term refers to the next 1 to 2 years.
  - Mid-term refers to the next 3 to 5 years.
  - Long-term refers to the next 6 to 20 years.
- **Lead, Support.** Proposed or determined lead and supporting entities (based on resources available) for a recommended activity.

The work plan includes the development of three strategic roadmaps that focus specifically on HB164 (2022) mandates that require additional detail and long-term strategy to implement. Namely, the mandate to 1) develop reclamation goals and timelines for the completion of cleanup activities at all uranium mine and mill sites; 2) establish an effective mechanism for consultation and coordination with the federal government; Indian nations, tribes and pueblos; communities impacted by uranium mining; and other states on uranium mine and mill reclamation activities; and 3) develop an estimate of the anticipated funding needed to undertake reclamation activities at all sites. The roadmaps are listed as activities in the work plan outlined below.

Table 10 further illustrates the timeframes for each of the recommended activities.

Table 9. Recommended activities for implementation organized by goals.

GOAL 1: Coordinate and Consult with NM Coordinating Agencies, the Federal Government, Indian Nations, Tribes, Pueblos and Impacted Communities on Uranium Cleanup, and Report to Legislature on Progress Regularly			
Recommended Activity	***Outcome***	***Timeframe***	***Lead, Support***
Reclamation Goals and Timeline Roadmap	• Existing reclamation goals for permitted sites and a process for establishing reclamation goals for 'neglected' sites are outlined. • Reclamation timelines for all sites are estimated (synthesizing information for specific sites with already established timelines and developing a timeline for sites or groups of sites not yet under reclamation).	Long-term	NMED, ONRT
Launch and update the Former Uranium Mines and Mills Dashboard's mine and mill site regulatory actions on an ongoing basis.	• The Dashboard is updated on an annual basis (or more frequently as needed). • Coordinating agencies and communities can easily access public, up-to-date, and accurate information on each mine and mill site to inform decision-making and coordination of efforts among agencies at each site.	Short-term, annually	NMED, EMNRD
Attend meetings hosted by the community, non-governmental organizations, and federal regulatory agencies.	• NMED and EMNRD hear and understand issues and concerns from the public.	Short-term, ongoing	NMED, EMNRD
Develop, and regularly update, a webpage for information on uranium mine and mill reclamation efforts, including recent news and reports presented to the Radioactive and Hazardous Materials Committee.	• Community awareness of the technical and regulatory aspects of uranium cleanup increases. • Opportunities are available for the community to provide input and share feedback.	Mid-term, annually	NMED, EMNRD
Modernize uranium mine and mill reclamation-related data into a central repository.	• All uranium-related files are digitized and electronically accessible. • Hardcopy and electronic files more easily conform to requirements under Administrative Record (1.13.3 and 1.13.11 NMAC) and Mining Registration and Reporting (19.7.1 NMAC) codes, saving time in retrieving files.	Long-term	EMNRD, NMED

Develop an Implementation Plan for Neglected Uranium Mine Cleanup Program	• A process for establishing reclamation goals for 'neglected' sites that is collaborative and clear. • Policies and procedures for a Uranium Mine Cleanup Program for neglected sites is drafted and made available for revision. • A pilot site or sites may be identified to work through interagency relationships and funding mechanisms.	Mid-term	NMED, ONRT
Develop a Coordination Roadmap and Terminology Crosswalk	• Described strategies for coordinating remediation work across federal agencies and tribal governments increase effective coordination. • Steps for a community engagement plan are laid out. • Conversations are more effective with a common understanding of how each agency uses the same term in different contexts.	Mid-term	NMED, ONRT

GOAL 2: Develop a Workforce Supporting Uranium Mine and Mill Reclamation			
Recommended Activity	***Outcome***	***Timeframe***	***Lead, Support***
Identify key partners and coordinating agencies and establish working relationships and outreach opportunities to collaboratively develop a uranium reclamation workforce. Develop a webpage for outreach for upcoming job training programs and updates on resources available to industry and candidates looking for work in the cleanup industry.	• A key team is identified with clarified roles and responsibilities for each entity to help develop the workforce, including communication and engagement guidelines or plans (e.g., coordination and data gathering mechanisms, formation of working groups). • Community awareness of available training and job opportunities increases through outreach and key messaging (e.g., one-stop-shop webpage with resources).	Mid-term	NMED, NMDWS, EDD, industry employers, New Mexico higher education institutions
Coordinate and promote a weeks-long, employer-led job training program, as well as building other high-quality and consistent education and training programs to support the uranium reclamation industry.	• An industry-specific job training program for reclamation activities is created and piloted to support industry in developing a reclamation workforce that supports New Mexican jobs and brings down the overall cost of reclamation. • An increase in the number of workers and an expanded uranium reclamation industry in New Mexico. • Community awareness on available training opportunities increases through outreach.	Mid-term	NMED, New Mexico higher education institutions, NMDWS, EDD, industry employers
Coordinate and promote business development and technical assistance programs for reclamation activities.	• Opportunities are identified to help local businesses and entrepreneurs (including those that are socially and/or economically disadvantaged) gain access to resources and succeed in cleanup activities. • Community awareness on available opportunities and technical assistance increases through outreach.	Mid-term	EDD, NMDWS, NMED, small businesses
Identify vacancies and recruit to fill the vacancies in the NMED Water Protection Division.	• NMED is able to fulfill its regulatory duties to protect New Mexicans' health and environment.	Mid-term	NMED, NMDWS
Collaborate on efforts to promote worker entrance into the uranium cleanup industry, an officially recognized target industry in New Mexico.	• Mine reclamation workforce is able to support uranium reclamation efforts in New Mexico. • Workforce benefits are promoted, and awareness increases through training programs and outreach efforts.	Long-term	EDD, NMDWS

GOAL 3: Ensure Sustainable Funding for Strategic Plan Implementation			
Recommended Activity	***Outcome***	***Timeframe***	***Lead, Support***
Develop a Funding Roadmap	• An estimate of the level of funding required to complete cleanup activities is known for all sites.	Long-term	NMED, ONRT
Manage the UMRRF as the mechanism to receive funds for projects related to uranium mine and mill site reclamation.	• The UMRRF has an established investment process. • Funds are identified, applied for, secured, and accessible to ensure programs continue.	Long-term	State Treasury, State Investment Council, NMED, EDD, EMNRD
Establish a policy/procedure to distribute funds from the UMRRF.	• Funding request application and/or form is developed. • Selection criteria and/or scoring guide is developed to help prioritize fund distribution. • A review panel is created to assess funding requests.	Short-term	State Treasury, State Investment Council, NMED, EDD, EMNRD-MMD
Explore potential partnerships with private philanthropic foundations that have supported uranium reclamation cleanup or workforce development efforts, or could support them through related initiatives (e.g., water quality, youth education and empowerment, business innovation).	• A list of potential private philanthropic donors is developed. • Private philanthropic donors support New Mexico's uranium workforce development and cleanup activities.	Mid-term	NMED, NMDWS

Development of Strategic Roadmaps

Three strategic roadmaps mentioned in Goals 1 and 3 above will be developed following this Strategic Plan. The roadmaps will describe detailed approaches for 1) developing reclamation goals and timelines for the completion of cleanup activities at specific sites and anticipated funding requirements; 2) establishing an effective mechanism for consultation and coordination with the federal government; Indian Nations, Tribes and Pueblos; communities impacted by uranium mining; and other states on uranium mine and mill reclamation activities; and 3) developing an estimate of the anticipated funding needed to undertake reclamation activities at all sites.

Reclamation Goals and Timeline Roadmap

The Reclamation Goals and Timeline (RGT) Roadmap will describe the development of reclamation goals and a timeline for reclamation/cleanup activities, as required by HB 164.

Setting Reclamation Goals

Due to the very large number of uranium mine and mill sites to be cleaned up, as well as the complex regulatory landscape that controls cleanup activities, the RGT Roadmap will likely take a nested approach to setting reclamation goals.

Overarching goals will first be established (likely based on state agency/departmental missions and how reclamation is defined in relevant state statutes and regulations). For example:

- The NMMA and NMMC regulations define reclamation as the employment of measures to mitigate disturbance and stabilize the permit area to minimize future impact on the environment and to protect air and water quality [Section 69-36-3(K); 19.10.1.7(R)(1)].
- The NMMA and NMMC regulations also require the protection of human health and safety, the environment, wildlife, and domestic animals (69-36-7.H.2 of the NMMA; 19.10.3.304.D.7.b, 19.10.5.507.B(2), 19.10.5.508.B and 19.10.6.603.C NMAC).
- The NMMA further requires the re-establishment of the environment to a self-sustaining ecosystem (Section 69-11(B)(3)).

Nested under these overarching goals, goals for subsets or groups of sites would then be developed. Sites may be grouped by lead regulatory authority(ies) involved. Such groups might include:

- NMED- and EMNRD-lead regulatory authority sites, with viable responsible parties (RP)
- Neglected AUMs (no identifiable RP or Potential RP)
- U.S. EPA Superfund sites
- Other federal sites
- U.S. Department of Energy's Defense-Related Uranium Mine (DRUM) sites
- U.S. Bureau of Land Management
- U.S. Nuclear Regulatory Commission and Department of Energy mill sites
- Sites on tribal lands

For sites where NMED and/or EMNRD are the lead regulatory agencies overseeing cleanup and at neglected AUMs, the state may have greater ability to set reclamation goals that direct the overall cleanup and timeline. For example, for neglected AUMs the initial reclamation goal may be to define the nature and extent of potential impacts at neglected AUMs, which would be accomplished by reviewing any available documentation/data and conducting initial site screens. Then, unique, site-specific goals may be developed for individual neglected AUM sites. These site-specific goals may include the media to be cleaned up (soil, groundwater, surface water, etc.), the geographical extent of the cleanup, the specific cleanup levels to be achieved for different contaminants, as well as goals about returning the site to a natural landscape (e.g., by revegetating with native plant species).

For sites where federal or tribal agencies are the lead regulatory authority, the state's reclamation goals may necessarily be limited to certain parts of the reclamation process. General goals for these groups of sites may include coordinating with federal and tribal agencies on reclamation activities or ensuring that laws are followed, and state standards are adequately incorporated into Applicable or Relevant and Appropriate Requirements (ARARs).

The RGT Roadmap is intended to be a flexible document and will recognize that there is often overlap between the site categories described above. For example, the Homestake site is a mill site with NRC regulatory authority, an EPA Superfund site, and NMED oversees a groundwater discharge permit linked to the site. Thus, the Homestake mill site may fit into several of the site categories listed above, and a general set of reclamation goals developed at the category or group level may not adequately address the site. Therefore, it will be particularly important to develop appropriate site-specific reclamation goals that take such complexities into account.

Developing Reclamation Timeline Roadmap

It will be challenging to develop an overall reclamation timeline for the hundreds of uranium mine and mill sites across New Mexico that are at different stages of investigation or cleanup, under different or multiple regulatory authorities, and that vary widely in size and complexity.

Some sites, or groups of sites, have schedules and timelines that are already set (and controlled) by a lead regulatory agency. For example, individual Superfund sites may have remedial investigation/feasibility study (RI/FS) and cleanup timelines set by EPA. By contrast, other categories of sites (e.g., DOE DRUM sites) may have more general timelines, such as a timeframe for completing initial site investigations, but may not have specific schedules for subsequent reclamation activities. Yet other sites (e.g., neglected AUMs) may not yet have a reclamation timeline at all.

Given this, developing an overall timeline will involve two broad types of activities:

Compiling and synthesizing all information for individual sites or groups of sites with already established timelines: This effort has been initiated for a subset of sites as a part of developing this *Strategic Plan* (see Appendix A and B that provide timeline details for seven mine sites and eight mill sites, respectively), and will be continued under the development of the RGT Roadmap.

Prioritizing and developing a timeline for sites that are not yet under reclamation: This will likely include neglected AUMs and sites currently under a federal agency that may be "released" to the state because they do not meet federal criteria but may meet state criteria for cleanup. The RGT Roadmap may include a process for prioritizing these sites for reclamation by applying criteria such as the type and magnitude of site hazards/risks, public accessibility, site size, land ownership, and other factors. Prioritized sites would then be placed earlier in the cleanup timeline.

The reclamation timeline will be more specific in nearer term horizons for which more detailed

information is available (e.g., the next 1-5 years), and at a more general level for longer term horizons (e.g., the next several decades). It is anticipated that periodic reviews of site prioritization rankings will occur based on new information/data about existing sites, and to reflect site cleanup completions. The timeline will be updated accordingly on an ongoing basis.

Coordination Roadmap

HB 164 specifies that relevant state agencies and departments identified in the bill shall support and work in conjunction with NMED on the reclamation efforts. HB 164 directs NMED establish an effective mechanism for consultation and coordination with the federal government, Indian Nations, Tribes and Pueblos, communities impacted by uranium mining, and other states on uranium mine and mill reclamation activities. The *Strategic Plan* provides an overview of how these coordination tasks will be accomplished, and the Coordination Roadmap will provide greater detail. There are many aspects to this coordination, including defining roles and responsibilities and identifying appropriate processes for working together effectively. The Coordination Roadmap will also identify available data and information sharing tools, and if necessary, develop new data and tools.

As described earlier in the *Strategic Plan*, an example of a relevant tool for enhancing coordination is the Former Uranium Mines and Mills Dashboard: an interactive web mapping tool that summarizes available mine and mill site information across New Mexico. The tool, developed by NMED in partnership with EMNRD, was made to serve as an informational tool for the public, but could also be useful to state agencies during reclamation planning and implementation. NMED will also create a dedicated website, which will be another online location for sharing information and updates with partners and the public on current reclamation activities.

The Coordination Roadmap will describe different strategies and processes that will be employed to coordinate technical and remediation work across the state and federal agencies/departments and tribal governments to best accomplish reclamation. Key strategies include:

- NMED may convene biannual inter-governmental coordination and update meetings. Participants may include state coordinating agencies, federal agencies with regulatory authority at former uranium mines and mills (e.g., EPA, DOE, DOI, DOD, NRC), and tribal governments. During these meetings, updates will be provided on progress towards implementing the *Strategic Plan*, and upcoming tasks will be identified and discussed.
- Ad hoc technical working groups may also be formed to address more focused topics. These groups would likely meet on a more frequent basis. For example, an ad hoc working group may be formed to develop and apply ranking criteria to prioritize reclamation activities at neglected AUMs. Outcomes of ad hoc working groups would be shared with the larger group during the biannual inter-governmental coordination meetings.
- Expert, small teams may be formed to support the development of site-specific reclamation goals and cleanup plans. This type of focused team would be comprised of representatives with site-specific knowledge and/or relevant technical expertise. Participants will vary per site, and may include state agencies, federal agencies and/or tribal governments.

The Coordination Roadmap will also describe steps to form a community engagement plan, ensuring the plan is developed with input from local communities, and that accessibility factors are taken into consideration (e.g., communities with limited access to internet and cell phone service). As with the *Strategic Plan*, the community engagement plan will be updated periodically to incorporate feedback

from communities, new communications strategies, and updates to the reclamation process that may affect how outreach is conducted.

Funding Roadmap

HB 164 requires the development of an estimate of funding requirements to complete the cleanup activities described in the *Strategic Plan*. Accordingly, the Funding Roadmap will lay out approaches and strategies to estimate funding needs and provide further detail on how funding requirements will be developed.

Funding needs will likely vary by category of site. For example, at sites where federal agencies or tribal governments are the regulatory lead, and at sites with an identified viable responsible party where NMED and/or EMNRD are lead, the state's main cost will be labor costs (agency staffing), and not actual cleanup costs. By contrast, for neglected AUM sites with no identified viable responsible party, the funding requirements will include the costs of all cleanup activities, in addition to agency staffing.

Because neglected AUMs are currently not well characterized and the required reclamation activities at each site are uncertain, it is challenging to develop a precise cleanup cost for these sites. Developing an estimate of these reclamation costs may therefore be iterative, with estimates refined as more information and data are gathered, and as time passes given inflation-related increase in cost. An initial broad range may be developed based on the number of sites, and a range in reclamation costs per site reported by other agencies for uranium mine and mill cleanup work. This estimate will then be refined as more site-specific data and information are gathered, and as cleanup workplans are developed, focusing first on higher priority sites.

Table 10. Gantt chart timeline for recommended activities.

	Short-term		Mid-term			Long-term
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
GOAL 1: Coordinate and consult with NM State Agencies, the Federal Government, Indian Nations, Tribes, Pueblos and Impacted Communities on Uranium Cleanup, and Report to Legislature Regularly on Progress						
Reclamation Goals and Timeline Roadmap.						
Launch and update the Former Uranium Mines and Mills Dashboard's mine and mill site regulatory actions on an ongoing basis.						
Attend meetings hosted by the community, non-governmental organizations, and federal regulatory agencies.						
Develop a webpage for information on uranium mine and mill reclamation efforts, including recent news and annual reports presented to the Radioactive and Hazardous Materials Committee.						
Modernize uranium mine and mill reclamation-related data into a central repository.						
Develop an Implementation Plan for a Uranium Mine Cleanup Program to address neglected uranium mine sites.						
Develop a Coordination Roadmap and Terminology Crosswalk.						

	Short-term		Mid-term			Long-term
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
GOAL 2: Develop a Workforce Supporting Uranium Mine and Mill Reclamation						
Identify key partners and coordinating agencies and establish working relationships and outreach opportunities to collaboratively develop a uranium reclamation workforce. Develop a webpage for outreach for upcoming job training programs and updates on resources available to industry and candidates looking for work in the cleanup industry.						
Coordinate and promote a weeks-long, employer-led job training program, as well as building other high-quality and consistent education and training programs to support the uranium reclamation industry.						
Coordinate and promote business development and technical assistance programs for reclamation activities.						
Identify vacancies and recruit to fill the vacancies in the NMED Water Protection Division.						
Collaborate on efforts to promote worker entrance into the uranium cleanup industry, an officially recognized target industry in New Mexico.						

	Short-term		Mid-term			Long-term
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6-20
GOAL 3: Ensure Sustainable Funding for Strategic Plan Implementation						
Develop a Funding Roadmap						
Manage the UMRRF as the mechanism to receive funds for projects related to uranium mine and mill site reclamation.						
Establish a policy/procedure to distribute funds from the Uranium Mine Reclamation Revolving Fund (UMRRF).						
Explore potential partnerships with private philanthropic foundations that have supported uranium reclamation cleanup or workforce development efforts, or could support them through related initiatives (e.g., water quality, youth education and empowerment, business innovation).						

The timelines for the former mine and mill sites (highlighted in Section III) to reach post-closure status are highlighted in Table 11 below. Note that additional details on the former mine and mill timelines can be found in Appendices A and B.

Table 11. Former mine and mill site timeline for post-closure status.

Main Phases: Partial Reclamation → Full Reclamation → Post-Closure	
Former Mines Status (Refer to Appendix A site reviews for more detail)	
Church Rock Mine	Post-Closure
JJ No. 1 Mine	Partial Reclamation
Mount Taylor Mine	Partial Reclamation
RAML (Section 17, 22, 24, 30, 30W, 33, 35 36 Mines)	Partial Reclamation
Saint Anthony Mine	Partial Reclamation
Section 12 Mine	Partial Reclamation
Section 27 Mine	Partial Reclamation
Former Mills Status (Refer to Appendix B site reviews for more detail)	
Ambrosia Lake Disposal Site	Post-Closure
Ambrosia Lake West Mill	Full Reclamation
Bluewater Mill	Post-Closure
Bokum Mill	N/A (never operated)
Church Rock Mill	Post-Closure
Homestake Mill	Partial Reclamation
L-Bar Mill	Post-Closure
Shiprock (Navajo) Mill	Because the site is located on the Navajo Nation, the State of New Mexico cannot weigh in on completion timeline or progression of cleanup.

In addition to the specific recommended activities and former mine and mill site timelines highlighted above in this section, NMED will continue to facilitate efforts with coordinating state agencies and departments to implement this *Strategic Plan* and other related uranium reclamation efforts (see list below in Table 12), as well as establish an effective mechanism to engage, consult, and coordinate with the federal government, Indian nations, tribes and pueblos, communities impacted by uranium mining, industries, and other states working on uranium mine and mill reclamation activities and workforce development efforts.

Table 12. Coordinating state agencies and related uranium reclamation nexus.

Coordinating Agencies	Related Uranium Reclamation Nexus
Cultural Affairs Department	• Conduct processes to evaluate governmental actions that have the potential to affect parcels and properties though the Historic Preservation Division and the State Historic Preservation Officer.
Department of Game and Fish	• Provide technical guidance for reclamation projects focusing on recommendations for ways to avoid or minimize potential impacts to wildlife during reclamation activities and on how to improve and enhance wildlife habitat within reclamation sites.

Department of Health	• Conduct water sampling events for well water general analytes and refer uranium or radioactive elemental testing requests to NMED. • As necessary, engage ATSDR's Partnership to Promote Local Efforts to Reduce Environmental Exposure ('APPLETREE') Cooperative Agreement Program to assess and respond to site-specific issues involving human exposure to hazardous substances in the environment, and provide health consultations as deemed necessary when there is new environmental data available.
Department of Transportation	• Conduct weight analysis for potential restrictions based on structure limits where applicable. • Post signage necessary for potential restrictions or public awareness. • Review and comment on site-specific documents and other technical support, as requested.
Department of Workforce Solutions	• Leverage existing programs with agencies—including but not limited to NMED, EMNRD, and EDD—to promote entrance into the uranium cleanup industry for unemployed and underemployed workers to aid in relevant training program availability and workforce readiness. • Coordinate with agencies to fund the creation of job training and recruitment programs to aid industries, higher education institutions, and local governments with uranium cleanup activities.
Economic Development Department	• Apply existing programs with agencies—including but not limited to NMED, EMNRD, and NMDWS—to promote entrance into the uranium cleanup industry for unemployed and underemployed workers to aid in relevant training program availability and workforce readiness. • Coordinate with agencies to fund new job training and recruitment programs to aid industries, higher education institutions, and local governments with uranium cleanup activities.
Energy, Minerals and Natural Resources Department	• Work with NMED Mining Environmental Compliance Section to move applicable reclamation permits forward. • Support NMED's Uranium Mine Reclamation Coordinator on projects related to HB 164 when additional resources are available.
Indian Affairs Department	• Assist with consultation, collaboration and communication with the Nations, Pueblos, and Tribes located within New Mexico per the State Tribal Collaborations Act.

Coordinating Agencies	Related Uranium Reclamation Nexus
Office of Natural Resources Trustee	• Collaborate with state, tribal, and federal entities on natural resource restoration activities. • Support uranium reclamation efforts by collaborating on analyzing and sharing data used to measure impacts of uranium mills and mines on New Mexico's natural resources. • Contribute useful expertise, knowledge, information, and data for uranium sites/districts that ONRT is currently assessing. • Facilitate communicating and coordinating with federal agencies, tribal governments, and local communities through ONRT's existing relationships. • Provide an avenue to incorporate human service losses more explicitly (e.g., cultural losses) into uranium reclamation processes. • Provide a cohesive framework for addressing uranium contamination that crosses regulatory boundaries and authorities.
Office of the State Engineer (Not a listed agency in HB 164)	• Implement institutional controls on well drilling where appropriate. • Issue well permits associated with uranium reclamation, restoration, and remediation in cooperation with NMED's efforts to protect human health and the environment. • Assess aquifers for impairment associated with former uranium mine and mill sites. • Regulate the issuance of well drilling permits (e.g., pump-and-treat options require a permit to appropriate water and possibly to obtain an adjudicated water right to offset depletions). • When abatement becomes difficult or impossible, establish drilling restrictions or prohibitions to allow for institutional controls described in Title 20 (20.6.2 NMAC).
State Land Office	• Coordinate on compliance issues at former uranium mine sites on state trust lands.

Conclusion

This *Strategic Plan* provides NMED a living guide to expand efforts focused on cleaning up the environmental impacts of legacy uranium mining in New Mexico. Collaborating with federal, state, and tribal entities, as well as communities on implementing this *Strategic Plan* will increase transparency regarding the ongoing cleanup efforts for the general public and the New Mexico Legislature. In addition, it will help accomplish the substantial reclamation efforts required to ensure clean water and land for all New Mexicans. Overall, this *Strategic Plan* will help NMED centralize and coordinate efforts and leverage opportunities for collaboration among coordinating agencies, as well as develop systems to measure progress and expand efforts to address environmental impacts of uranium mining and milling in the state.

Abbreviations

AEC	Atomic Energy Commission
AML	Abandoned Mine Lands
AUMs	abandoned uranium mines
BBER	University of New Mexico's Bureau of Business & Economic Research
BIL	Bipartisan Infrastructure Law
BLM	U.S. Bureau of Land Management
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
Dashboard	Former Uranium Mines and Mills Dashboard
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
DRUM	Defense-Related Uranium Mine
EDA	U.S. Economic Development Administration
EDD	New Mexico Economic Development Department
EMNRD	New Mexico Energy, Minerals, and Natural Resources Department
EPA	U.S. Environmental Protection Agency
ERG	Eastern Research Group, Inc.
FA	financial assurance
FIU	Florida International University
HB 164	House Bill 164 (2022)
HUD	U.S. Department of Housing and Urban Development
IMRP	Inactive Mine Reclamation Program
LM	Office of Legacy Management
MES	Mentorship for Environmental Scholars
MOAs	memorandum of agreements
MOUs	memorandum of understandings
NMAC	New Mexico Administrative Code
NMDWS	New Mexico Department of Workforce Solutions
NMED	New Mexico Environment Department

NMOSE	New Mexico Office of the State Engineer
NRC	U.S. Nuclear Regulatory Commission
NSF	National Science Foundation
ONRT	New Mexico Office of Natural Resources Trustee
OSHA	Occupational Safety and Health Administration
OSMRE	Office of Surface Mining Reclamation and Enforcement
pCi/g	picocuries per gram
RAES	Response, Assessment, and Evaluation Services
RAML	Rio Algom Mining, LLC
RP	responsible party
STEM	science, technology, engineering, and mathematics
Strategic Plan	New Mexico Uranium Reclamation 2023 Strategic Plan
Tronox	Tronox Incorporated
UMRRF	Uranium Mine Reclamation Revolving Fund
UMTRCA	Uranium Mill Tailings Radiation Control Act
USFS	U.S. Forest Service
V&V	Validation and Verification
WIOA	Workforce Innovation and Opportunity Act

Terminology Reference

This is a preliminary reference tool and is not an official resource document. A future document (as listed in the Work Plan) will address the varying differences between state and federal agency terminology. A 'terminology crosswalk' will be developed to facilitate communication and coordination between agencies. This work will be completed under the Work Plan activity referred to as the Coordination Roadmap.

Background: Radiation levels generally representative of pre-mining conditions from cosmic sources, naturally occurring radioactive material including radon (except as a decay product of source or special nuclear material), and global fallout as it exists in the environment from the testing of nuclear explosive devices or from nuclear accidents like Chernobyl that contribute to background radiation.

Curie (Ci): A quantitative measure of radioactivity. One curie = 2.22×10^{12} disintegrations per minute. Fractions of a curie—such as picocuries (pCi), or 10^{-12} Ci, and microcuries (µCi), or 10^{-6} Ci—are levels typically encountered in radiation measurements of naturally occurring radioactive material or technically enhanced naturally occurring radioactive material.

Exposure: The amount of external gamma radiation received from the surface of a proposed or new mine site, soil pile, waste rock pile, stockpile, ore pile, or similar feature.

Gamma radiation: A true ray of energy, in contrast to beta and alpha radiation, which are particulate. The properties of gamma rays are similar to X-rays and other electromagnetic waves. Gamma radiation is highly penetrating, but relatively low in ionizing potential.

Groundwater remediation: 1) Actions necessary to investigate, prevent, minimize or mitigate damages to the public health or to the environment that may otherwise result from a release or threat of release; and 2) the cleanup or removal of released contaminants to conform with applicable standards.

Legacy mining: The action of mining abandoned mines that were left unreclaimed where no individual or company has reclamation responsibility and there is no closure plan in effect.

Long-term monitoring: Documenting changes in a site (e.g., mine or mill site) or in the land over a period of time.

Natural resource restoration: Returning natural resources and the services they provide to their pre-release, or baseline condition or, if that isn't possible, replacing or acquiring the equivalent.

Neglected contaminated site: (formerly Orphan site)

Permit area: The geographical area defined in the permit for a mining operation on which operations are conducted or cause disturbance.

Post-reclamation radiation level (PRRL): The amount of radiation emanating from a mine site after reclamation has been completed. In order to demonstrate adequate radiation reclamation under the guidance document, the PRRL must be equal to or less than the site-specific value of gamma radiation that has been correlated to an activity level for radium-226 soil of 5 pCi/g + background at the 95th percentile confidence level for the complete sitewide radiation data set.

Reclamation: The use, both during and after a mining operation, of measures designed to mitigate the disturbance of affected and permit areas and, to the extent practicable, provide for the stabilization of a permit area following mine closure that will minimize future impact to the environment from the mining operation and protect air, soil, habitat, flora, fauna, and water resources.

Safeguarding: The physical closing off or fencing off of all openings on a property, including posting warning signs.

Site: Any mine, mill, or extraction facility installation, or discrete, physically separate parcel of land(s) disturbed by mining or uranium extraction, or any building or structure or portion thereof.

Surface reclamation: The use, both during and after mining operations, of measures designed to mitigate the disturbance of surface areas.

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Appendices

A. Former Mine Site Reviews
B. Former Mill Site Reviews
C. NMED's 2023 "Abandoned Uranium Mines Data Gaps Analysis" Report
D. NMDWS's Economic Research and Analysis Bureau Skills-matching Report
E. Funding Opportunities Related to Workforce Development and Cleanup Activities

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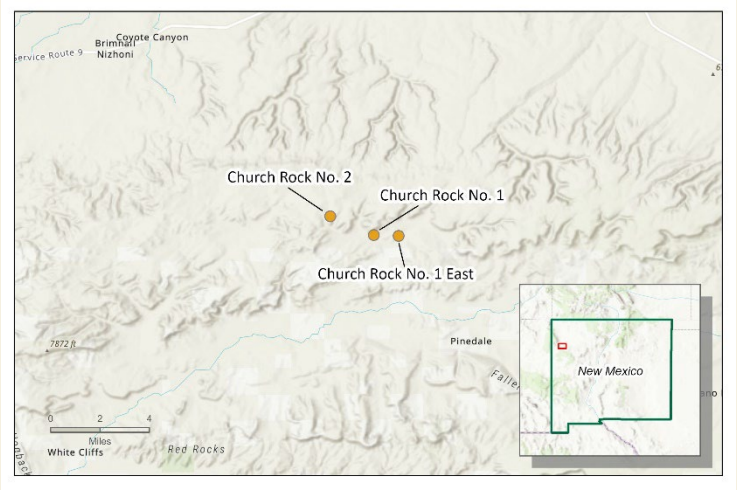
Appendix A. Former Mine Site Reviews

Church Rock Mine Site Review

Location

The Church Rock Mine is located in Church Rock, New Mexico, surrounded by the Navajo Native American Reservation and Tribal Allotment within the Pinedale Chapter. The site is located approximately 17 miles northeast of Gallup, New Mexico, in McKinley County in the Church Rock-Crownpoint mining district.



Ownership and History

The Church Rock Mine site was a combined mine/mill site. See the Church Rock Mill site review for more information.

Reclamation and Regulatory Jurisdiction

See the Church Rock Mill site review for more information.

Timeline for Completing Cleanup Activities

See the Church Rock Mill site review for more information.

Coordination Between State and Federal Agencies

See the Church Rock Mill site review for more information.

Anticipated Funding Requirements

See the Church Rock Mill site review for more information.

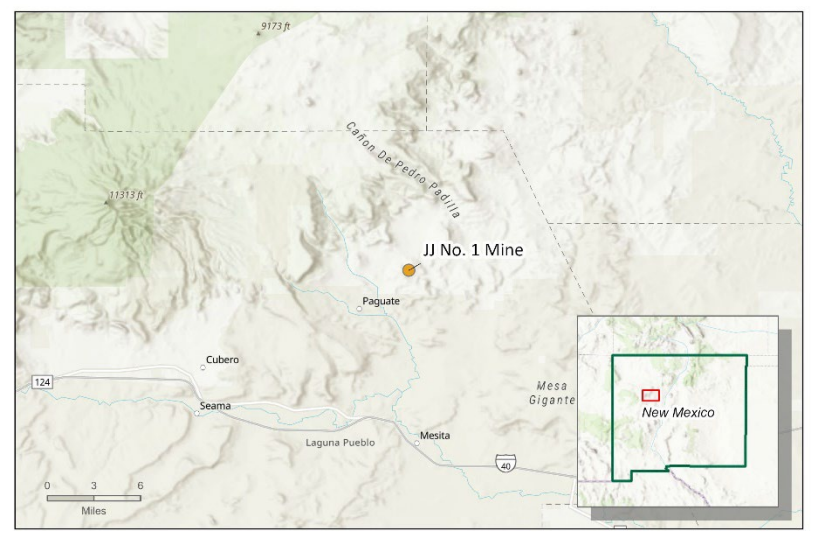
Disclaimer

Site reviews in this report provide the reader with a general history and status of permitted mines and mills. For brevity, they may not provide all relevant details or agency actions related to each site.

JJ No. 1 Mine Site Review

Location

The JJ No. 1 Mine is located approximately 3.5 miles southeast of Cebolleta (also spelled Seboyeta in published documents), 2.25 miles east/northeast of Moquino, and 1 mile north of the Laguna Indian Reservation in Cibola County, New Mexico, within Township G46. The nearest town is Bibo, New Mexico.



Ownership and History

Sohio Western Mining Company (SWMC), which was acquired by Kennecott Energy Company and subsequently by Rio Tinto Closures, leased the JJ No. 1 Mine from the Cebolleta Land Grant and began the main hoist shaft construction in 1975. The mine was an underground, conventional room-and-pillar mine that intercepted groundwater. Pumping groundwater was required to develop the underground mining operation. SWMC extracted uranium ore between 1976 and 1981. SWMC remains the owner and manager of the mine. The uranium ore was sourced from the Jackpile Sandstone Member of the Upper Jurassic Morrison formation. Historical mine assessments identified five areas of potential economical ore deposits, two of which were mined at the JJ No.1 Mine. The mine was operated in conjunction with the L-Bar uranium mill, which was less than a mile away from the mine's hoist shaft. Starting in 1981, SWMC put the mine on standby due to poor economics of uranium production, and it eventually closed in 1986. Dewatering of the underground workings ceased in early 1986 and the mine was allowed to flood. SWMC began initial reclamation in 1986. The land is now used as wildlife habitat and for cattle grazing. There are no structures or utilities on the mine site.

Reclamation and Regulatory Jurisdiction

Pursuant to the L-Bar Reclamation and Closure Plan dated October 1, 1986 (and modified February 1989), SWMC conducted the initial JJ No. 1 Mine closure in tandem with the decommissioning and closure of the L-Bar Mill (see the L-Bar Mill site review for more information). The mine's surface facilities—including a 90-foot headframe, 150-ton capacity enclosed ore bin, a double-drum ore hoist and service hoist, a building (that contained hoist facilities, offices, an employee change room, and air compressors), a standby diesel generator, water supply tanks and lines, and other service and support facilities—were decommissioned, demolished, and salvaged in 1986 and 1987. The main hoist shaft was sealed with a concrete cap, steel vent shaft liners were capped with welded plates, and the disturbed surface areas around the main shaft and mine offices were graded, contoured, and revegetated by local volunteers. All waste rock in the vicinity of the headframe was transferred to the tailings area during reclamation.

NMED

The New Mexico Environmental Department (NMED) began regulating the JJ No. 1 Mine in 2005 when SWMC approached NMED regarding permanent closure and entered the abatement planning process. In September 2009, SWMC submitted a Stage 1 Abatement Plan to define the nature and extent of groundwater contamination at the site and collect data necessary to select and design an effective groundwater abatement remedy. SWMC drilled, constructed, tested, and sampled multiple monitoring wells, collected water levels and groundwater samples from the 10 vent shafts, and conducted an inventory of water wells within a 1.25-mile radius of the mine site. SWMC submitted the documentation of the resulting data in the Stage 1 Abatement Final Site Investigation Report to NMED in July 2017. In October 2017, NMED approved SWMC's Stage 1 Final Site Investigation for the JJ No. 1 Mine and required submittal of the Stage 2 Abatement Plan. The Stage 2 Abatement plan was submitted to NMED in June 2018 and a Request for Additional Information (RFAI) was sent to SWMC in August 2018. SWMC responded to the RFAI in March 2019. NMED approved the Stage 2 Abatement Plan in October 2023 and is currently reviewing the Stage 2 Abatement Report and reclamation activities under MMD. Current groundwater constituents above the New Mexico Administrative Code groundwater quality standards include fluoride, sulfate, total dissolved solids, uranium, and combined radium-226 and radium-228.
SWMC conducts quarterly water level monitoring and semiannual water quality sampling across all five groundwater monitoring wells, which NMED has reviewed as part of ongoing monitoring.

Regulatory Tracks

- No discharge permits are registered with NMED.
- Under NMED, the JJ No. 1 Mine is regulated under an abatement plan, which addresses remediation of groundwater impacts, as well as long-term groundwater monitoring.
- Under the Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department, JJ No. 1 Mine is regulated under a Mining Act permit, which addresses surface reclamation.

EMNRD-MMD

This site is at the end of the 12-year vegetation establishment period in 2023. Most recently, SWMC has submitted the final 2021 Revegetation Evaluation Report, the 2022 Revegetation Evaluation Report with associated variance letter, and the final workplan for erosion and mitigation work to be done on the site. The mitigation workplan is currently being implemented and is scheduled for completion in November 2024. The New Mexico Department of Energy, Minerals, and Natural Resources (EMNRD) Mining and Minerals Division (MMD) will require one year to evaluate the work. If SMWC has implemented this erosion work in an acceptable matter, MMD will then allow the operator to apply for release of the site under the New Mexico Mining Act and Rules.

Timelines for Completing Cleanup Activities

The estimated timeline for completing the cleanup, per EMNRD-MMD, is two years. If the Stage 2 Abatement Plan is approved by NMED and Alternative Abatement Standards are granted by the Water Quality Control Commission, the water quality will be monitored for the foreseeable future, but no other abatement actions will be performed unless conditions change.

Coordination Between State and Federal Agencies

JJ No. 1 Mine is currently regulated by two New Mexico agencies: NMED and EMNRD-MMD. JJ No. 1 Mine is not regulated by the U.S. Nuclear Regulatory Commission nor the U.S. Department of Energy.

Anticipated Funding Requirements

Funding for all site reclamation, abatement, remediation, and long-term monitoring actions regulated by NMED and EMNRD-MMD is covered by SWMC, the responsible party for the JJ No. 1 Mine.

There is no anticipated funding needed from the state or other entity for the JJ No. 1 Mine. SWMC is responsible for all costs associated with closure and abatement. Currently, MMD holds $53,685.60 in financial assurance to cover revegetation costs until the mine site is released from the New Mexico Mining Act.

Disclaimer

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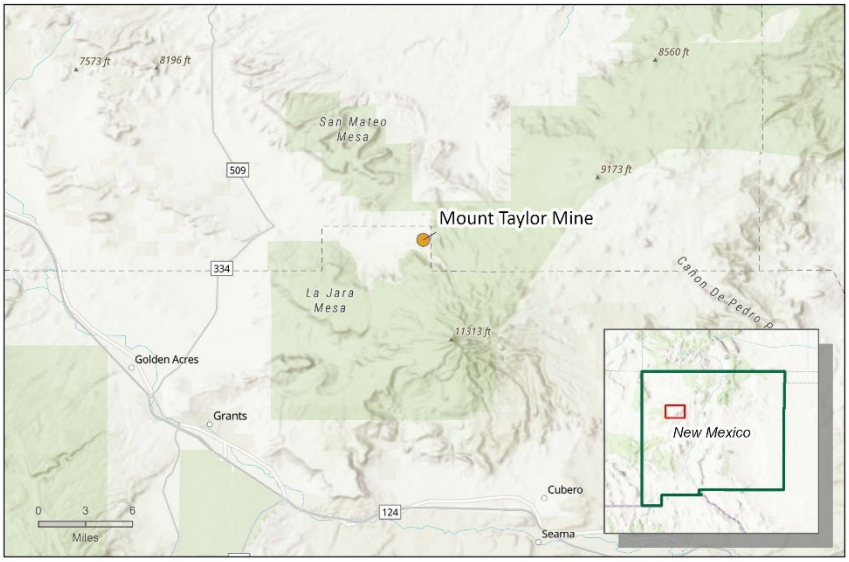
Mt. Taylor Mine Site Review

Location

The Mt. Taylor Mine is located approximately 18.5 miles northeast of Milan, New Mexico, a half mile northeast of the village of San Mateo in Cibola County, New Mexico, in the eastern half of Section 24, Township 13 North, Range 8 West.



Ownership and History

Gulf Mineral Resources Corporation (Gulf) first purchased the property in 1971. Gulf then began developing the mine workings by constructing two shafts (24- and 14-foot diameter) to access the uranium ore body between 3,100 and 3,200 feet below ground surface within the Westwater Canyon Member of the Morrison Formation. In order to sink the shafts and develop the underground mine, Gulf dewatered three aquifers through a series of groundwater withdrawal wells installed in the 1970s. The shafts were constructed with traditional drill-and-blast methods with concrete liners. Ore production began in 1980 and continued until September 1982. Gulf merged with Chevron Resources Company (CRC) in 1985, and the property was transferred to CRC. After Gulf merged with CRC, CRC produced ore from 1986 to 1990. CRC used conventional room-and-pillar underground mining methods and extracted approximately 675,000 tons of uranium ore and 698,000 tons of waste rock.

Rio Grande Resources Corporation (RGR) purchased the mine from CRC in 1991. Due to unfavorable market conditions, RGR never operated the mine. In 2019, RGR initiated closure of the mine. Closure/closeout activities commenced under the New Mexico Environment Department (NMED) groundwater Discharge Permit 61 (DP-61) and the Energy, Minerals, and Natural Resources Department (EMNRD) Mining and Minerals Division (MMD) Mining Act Permit No. CI002RE. Prior to closure/closeout commencing at the mine, the Mt. Taylor Mine surface facilities included two shafts, an ore stockpile, the South Waste Rock Pile, two stormwater retention ponds, the Sewage Treatment Plant, an ion exchange plant, eight clay-lined treatment ponds, and numerous service and support facilities.

Reclamation and Regulatory Jurisdiction

RGR commenced closure/closeout activities. However, completion of these activities on the site is pending the approval of the Closure/Closeout Plan with NMED and EMNRD. Closure/closeout activities include but are not limited to: surface reclamation of onsite facilities including soil cleanup and consolidation of impacted material, as well as decommissioning and demolition of service and support facilities.

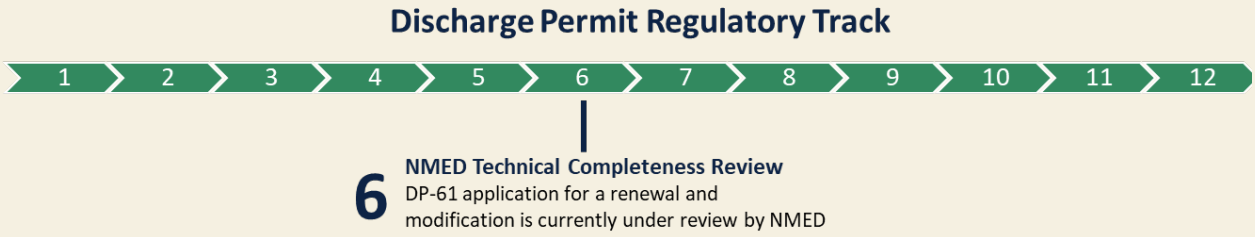
NMED

The Environmental Improvement Division of the New Mexico Health and Environment Department (HED) first issued DP-61 in 1979 for discharges of treated mine water into a series of clay-lined and synthetically lined ponds. The permit was issued pursuant to the New Mexico Water Quality Act, New Mexico Statutes Annotated 1978 §§ 74-6-1 through 74-6-17 and the New Mexico Water Quality Commission Control Commission Ground and Surface Water Protection Regulations in 20.6.2 New Mexico Administrative Code (NMAC). In 1991, HED became NMED. NMED regulates the Mt. Taylor Mine pursuant to DP-61 and an approved Stage 2 Abatement Plan. DP-61 was renewed in 1984, 1989, 1995, and 2015. RGR submitted a timely renewal and modification application in 2020, thereby administratively continuing the discharge permit. A draft discharge permit was completed in 2024 but additional information from RGR was requested. DP-61 currently authorizes discharges from dewatering the underground mine, impacted stormwater, the Sewage Treatment Plant, and truck washing.

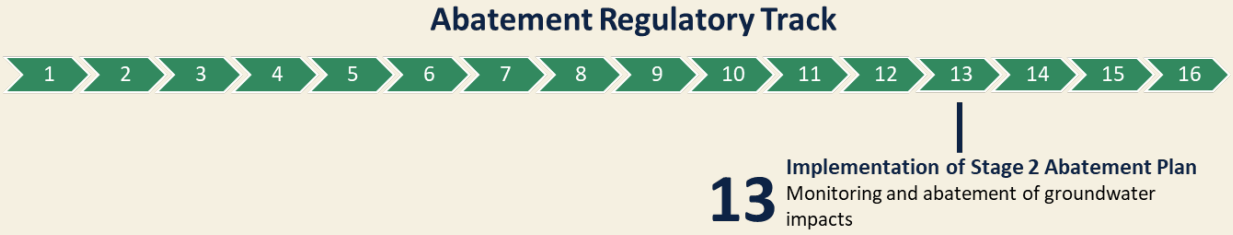
Regulatory Tracks

- Under NMED, Mt. Taylor Mine is regulated under a groundwater discharge permit and abatement plan, which address discharges to surface water and groundwater, remediation of groundwater impacts, and long-term groundwater monitoring.
- Under EMNRD-MMD, Mt. Taylor Mine is regulated under a Mining Act Permit, which addresses surface reclamation.

On December 22, 1980, EID issued Gulf DP-117 for discharges associated with a proposed uranium mill. The mill was never constructed and NMED terminated the discharge permit on July 27, 2016. Additionally, NMED issued DP-1712 to RGR on July 7, 2010, which authorized discharges associated with a water treatment pilot study to determine the most efficient method for removing uranium from mine water. Mine water was pumped into an onsite surface treatment system to treat the water to 20.6.2.3103 NMAC groundwater standards. The treated water was discharged into the 14-foot shaft. RGR completed the pilot study and DP- 1712 was terminated by NMED on July 24, 2012.

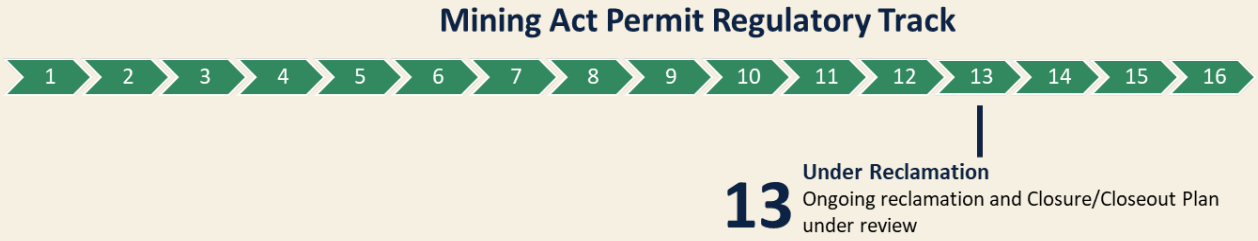


In March of 2005, RGR submitted a Stage 1 Abatement Plan due to elevated concentrations of nitrate, chloride, sulfate, and total dissolved solids observed in an alluvial monitoring well on site. During Stage 1 abatement, RGR drilled and installed additional alluvial monitoring wells and sampling boreholes to investigate the nature and extent of the contamination. In 2009, NMED approved RGR's Final Site Investigation Report and required submittal of the Stage 2 Abatement Plan. NMED approved RGR's Stage 2 Abatement Plan in 2011. RGR is required to abate impacts to groundwater for the following constituents: nitrate, uranium, selenium, sulfate, and total dissolved solids. Quarterly sampling is conducted across the alluvial well network. Additionally, four groundwater extraction wells pump impacted groundwater into a high-density polyethylene double-lined pond with leak detection for evaporative treatment.



EMNRD-MMD

The New Mexico Mining Act was promulgated in 1993 and the rules went into effect in 1994. The same year, RGR submitted a regular existing mine application to MMD. MMD assigned the Mt. Taylor Mine, Mining Act Permit No. CI002RE, as an existing regular mine pursuant to the New Mexico Mining Act, New Mexico Statutes Annotated, § 69-36-1, et seq. and the Mining Act Rules Title 19, Chapter 10, Parts 1 through 14 NMAC. MMD issued the first Mining Act Permit to RGR in 1995. In 1998, MMD issued Revision 98-1 incorporating the Closure/Closeout Plan into the permit. In 1999, 2005, and 2011, MMD issued revisions to the Mining Act Permit putting the mine on standby status for a period of five years. In 2013, RGR applied to update the Closure/Closeout Plan and financial assurance for the mine through Revision 13-1, but this application was withdrawn in 2015 while it was still in review. In 2017, MMD approved Revision 13-2 updating the site's Closure/Closeout Plan and financial assurance, as well as returning the mine to active status. During the timeframe while Revision 13-2 was being processed, RGR applied to extend standby status through Revision 14-1 for another five years due to the impending expiration of Revision 10-1. Revision 14-1 was never completed, and the Mining Act Permit moved forward with Revision 13-2. In 2022, RGR submitted an updated Closure/Closeout Plan and financial assurance for the mine site through Revision 22-1. This revision is currently under review by MMD and NMED. The Mt. Taylor Mine is currently in reclamation status, and closure/closeout activities will continue pursuant to conditions of Revision 22-1.



EPA

Mt. Taylor Mine had a National Pollution Discharge Elimination System (NPDES) permit issued by the United States Environmental Protection Agency (EPA) from July 3, 1976, through September 30, 2021. The NPDES permit addressed point-source discharges of treated mine water that were conveyed from the mine site through a 4-mile-long pipeline that discharged into San Lucas Canyon. RGR terminated the NPDES Individual Permit because it was no longer required due to the mine closing and cessation of discharges from the outfall. Stormwater discharges are still regulated by EPA under a Multi-Sector General Permit (NPDES permit #NMR05GB27).

Timelines for the Completion of Cleanup Activities

RGR submitted a renewal and modification application for DP-61 in 2020. NMED is performing a technical review of the application, and once deemed technically complete, NMED will draft the discharge permit and provide it to the public for review, comment, and the opportunity for a hearing. RGR also submitted an updated Closure/Closeout Plan in 2021 to both NMED and MMD as part of the renewal and modification of DP-61 and renewal of Mining Act Permit CI002RE. RGR will need the renewed and modified groundwater discharge permit and renewed Mining Act Permit to commence closure/closeout of the mine site.

NMED will continue to regulate Mt. Taylor Mine under DP-61 and the Stage 2 Abatement Plan, including regulating closure activities, post-closure maintenance and monitoring, and the abatement of existing contaminants in impacted aquifers. NMED will continue long-term groundwater monitoring for decades to ensure the abatement strategies are effective and site reclamation and cleanup is protective of groundwater and surface water. Stage 2 abatement is ongoing and therefore there is no estimate for a completion date for NMED functions.

MMD continues to regulate the ongoing surface reclamation, which is estimated to be complete 26 months after the final approval of the Closure/Closeout Plan currently under review. When the surface reclamation is completed, erosion and vegetation monitoring will continue for a minimum period of 12 years.

Coordination Between State and Federal Agencies

Mt. Taylor Mine is predominately regulated by two New Mexico agencies; NMED and EMNRD-MMD. EPA currently regulates stormwater discharges through the active Multi-Sector General Permit #NMR05GB27. Other than this permit, there are no other federal agencies regulating this site. Mt. Taylor Mine is not regulated by the U.S. Nuclear Regulatory Commission nor the U.S. Department of Energy. Coordination with federal agencies is not anticipated due to unconnected regulatory jurisdiction at this site.

Anticipated Funding Requirements

Funding for all site reclamation, abatement, remediation, and long-term monitoring actions regulated by NMED and EMNRD-MMD are covered by RGR, the responsible party for Mt. Taylor Mine. Financial assurance of $7,606,477 is held jointly by NMED and EMNRD-MMD and is in place for cleanup activities in the event of a forfeiture.

There is no anticipated funding needed from the state or other entity for Mt. Taylor Mine. RGR is responsible for all costs associated with closure and abatement.

Disclaimer

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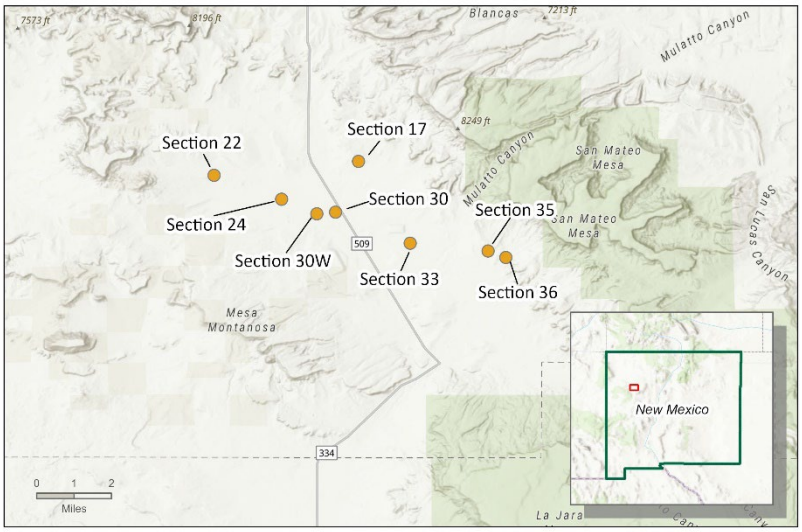
Rio Algom Mines Site Review

Location

Sections 17, 22, 24, 30, 30 West (W), 33, 35, and 36 mines are at eight different locations in the Ambrosia Lake mining subdistrict near Milan, New Mexico. Sections 17, 22, 24, 30, 30W, 33, and 35 are in Township 14N; Section 36 spans townships 13N and 14N.



Ownership and History

Sections 17, 22, 24, 30, 30W, 33, 35, and 36 mine sites were previously owned and operated by the Kermac Nuclear Fuels Corporation, a partnership of Kerr-McGee Oil Industries, Inc.; Anderson Development Corporation; and Pacific Uranium Mines Co. The Kermac Nuclear Fuels Corp Quivira Mining Co., a subsidiary of Kerr-McGee Corp., took over operations in 1983 (note, in 2006, Kerr-McGee created the subsidiary company Tronox Incorporated that took over liability for the mine sites; see section below on *Coordination Between State and Federal Agencies* for more information). Rio Algom Mining, LLC. (RAML), purchased Quivira Mining in 1989. RAML was purchased by Billiton in 2000 but remains a subsidiary of BHP Billiton. RAML currently owns the mine sections noted above. Uranium ore was extracted from underground workings and milled at the Ambrosia Lake West Mill (ALW) from 1958 through 1985. For additional information on the Ambrosia Lake West Mill, see the Ambrosia Lake West Mill site review.

Section 17, 22, 24, 30, 30W, 33, 35, and 36 mines were underground, conventional room-and-pillar mines that intercepted groundwater. Pumping groundwater was required to develop the underground mining operation. The groundwater exceeded water quality standards and required treatment prior to being discharged. Ion exchange (IX) facilities and settling ponds were installed to treat mine water prior to discharge. The conventional mining, groundwater pumping, and treatment occurred at Sections 17, 22, 24, 30, 30W, 33, 35, and 36 mines between 1958 and 1985.

To recover additional uranium from an area that had previously been conventionally mined, Kerr-McGee used a method of stope leaching to recover an additional approximately 30% of uranium resources. Stope leaching involves circulating a leach solution through the stope to dissolve the remaining uranium. The resulting solution is then pumped to the surface, where the uranium is removed, and the leach solution is then recirculated. Stope leaching occurred at various mined sections on site.

Sandfill operations occurred at Section 22, 30, 30W, 35, and 36 mines. Sandfilling is a process of using mine tailings to fill mined-out stopes to prevent caving or subsidence while mining continues.

Reclamation and Regulatory Jurisdiction

The New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) Mining and Mineral Division (MMD) and the New Mexico Environment Department (NMED) are the state agencies with regulatory jurisdiction over the Rio Algom Mine sites. The reclamation goal for Section 17, 22, 24, 30, 30W, 33, and 35 mines is full release from MMD, completed groundwater abatement activities under NMED, and long-term monitoring also under NMED. NMED is currently working with RAML and other regulatory agencies on overlapping jurisdiction. All RAML discharge permits, or DPs, are not reflective of current site conditions. NMED and RAML are determining the permitting future for the site as it moves toward full closure.

Regulatory Tracks

- Discharge permits DP-362, DP-67, DP-264, DP-71 are registered with NMED.
- All discharge permits are under Stage 1 Abatement.
- Section 17, 22, 24, 30, 30W, 33, and 35 mines are under an Existing Mine Permit MK009RE.

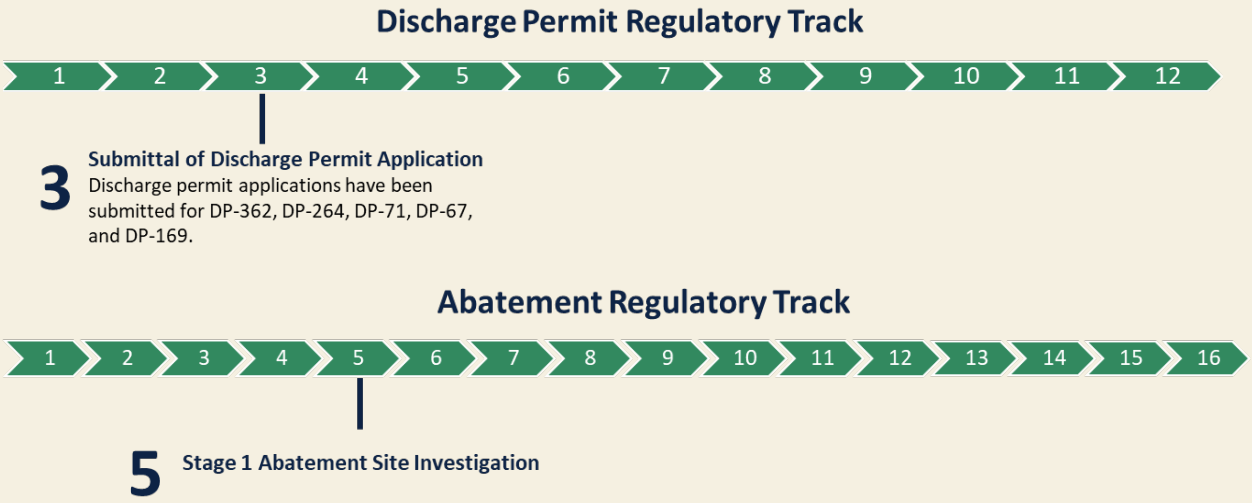
NMED

DP-362. In 1983, The Environmental Improvement Division of the New Mexico Health and Environment Department (HED-EID, the predecessor of NMED) determined that the old stope leaching process described above would require a discharge permit under the New Mexico Water Quality Control Commission Regulations promulgated in 20.6.2.3000 New Mexico Administrative Code (NMAC). HED-EID issued DP-362 in 1985. DP-362 has had timely renewals and approvals since 1985, with the most recent application for renewal submitted in 2012. At this time, DP-362 is administratively continued while NMED and other regulatory agencies determine jurisdiction of the mines. DP-362 authorized old stope leaching at Section 17, 19, 22, 24, 30, 30W, 33, and 35 mines and includes monitoring and reporting requirements. Groundwater abatement for facilities and activities under DP-362 began in 2008. DP-362 also includes closure requirements. In 2020, NMED and MMD worked with RAML to develop an interim closure plan. This plan updated the financial assurance and established general practices to be implemented at final closure.

DP-67. In 1985, HED-EID issued DP-67, which authorized discharge of mine water from the IX facility and treatment ponds from the Section 35 and 36 Mines and associated monitoring, reporting, and closure requirements. Timely renewals of the permit were submitted through 1997, when the permit was last renewed. The permit is administratively continued at this time. Groundwater abatement for facilities and activities under DP-67 began in 2008. In 2020, NMED and MMD worked with RAML to develop an interim closure plan. This plan updated the financial assurance and established general practices to be implemented at final closure.

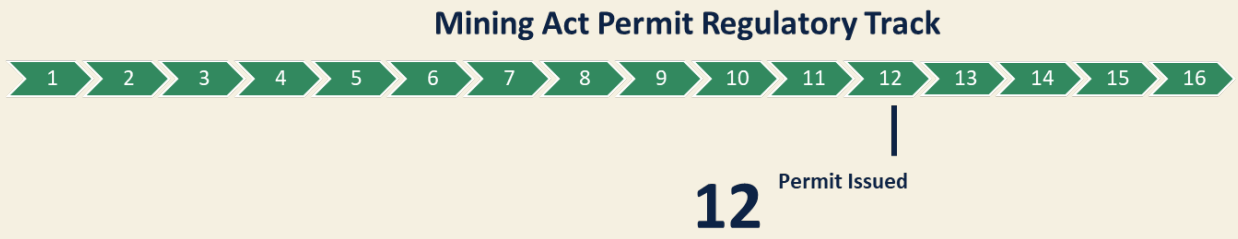
DP-264. HED-EID issued DP-264 in 1983. DP-264 is for backfilling activities in Section 35 and 36 mines. Kerr-McGee submitted timely renewals of the permit through 1990, when the permit was last renewed. Monitoring, reporting, and closure requirements are also a part of DP-264. Abatement activities under DP-264 are addressed in DP-362. In 2020, NMED and MMD worked with RAML to develop an interim closure plan. This plan updated the financial assurance and established general practices to be implemented at final closure.

DP-71. DP-71 authorized discharge of fluids from ALW and associated mines into 11 evaporation ponds in Section 4. DP-71 was first issued by HED-EID in August of 1979. Kerr-McGee submitted timely renewals through 2003, when the permit was last renewed. DP-71 is administratively continued and remains an active permit. Monitoring, reporting, and closure requirements are also a part of DP-71. Abatement activities under DP-71 are addressed in DP-362. In 2020, NMED and MMD worked with RAML to develop an interim closure plan. This plan updated the financial assurance and established general practices to be implemented at final closure.



EMNRD-MMD

Section 17, 22, 24, 30, 30W, 33, and 35 mines are all under the Existing Mine Permit MK009RE. MMD is holding joint financial assurance with NMED based off an interim Closure/Closeout Plan. Reclamation at these sites is not complete due to ongoing negotiations with the U.S. Environmental Protection Agency (EPA) and the U.S. Nuclear Regulatory Commission (NRC) associated with the Tronox settlement and San Mateo Creek Basin regional work. See Section D. Unique Situation: Tronox for more information on the Tronox settlement. Section 36 mine is prior reclamation released by MMD, but additional surface work may be required under NMED.



Closure/Closeout Plan. Reclamation began on Section 17, 22, 24, 30, 30W, 33, and 35 mines in 1994 under the Prior Reclamation Criteria of the New Mexico Mining Act (NMMA) Rules (19.10.5.511 NMAC). Additional surface reclamation work occurred at the Section 17, 22, 24, 30, 30W, 33, and 35 mines from 2003 through 2005 under an Existing Mine Permit (MK009RE) through the NMMA Rules (19.10.5. NMAC) with EMNRD. The Existing Mine Permit required

that Quivira Mining develop an approved Closeout Plan. In 2003, RAML performed additional reclamation work under the Closeout Plan, which included further demolition and disposal of surface facilities, contour work and revegetation of the surface, and plugging of the main shaft, ventilation holes, and injection holes. Section 17, 22, 24, 30, 30W, and 33 mines have not yet been released by EMNRD from requirements of the NMMA and remain subject to permit number MK009RE, which was updated in 2021. Most formerly active operational mine structures have been removed from the sites, but soil cleanup is not complete due to residual uranium contamination.

NMED and EMNRD-MMD approved a Revised Interim Closure/Closeout Plan in November 2020 that addresses closure activities associated with DP-362, DP-71, DP-67, and DP-264, as well as ongoing surface reclamation covered under EMNRD-MMD.

Timelines for Completing Cleanup Activities

Reclamation and abatement actions are planned to continue for the foreseeable future and the estimated date of completion is unknown.

Coordination Between State and Federal Agencies

The NRC is the regulatory agency responsible for managing uranium beneficiation byproduct material. At some RAML mines, byproduct material is comingled with mining-related material. The NRC is determining whether it has jurisdiction over comingled impacts. EPA Regions 9 and 6 are the signatory of the Tronox settlement agreement. Tronox Incorporated is a spinoff company created by Kerr-McGee Corporation. All RAML mines are considered Tronox mines. RAML is under ongoing negotiations with EPA regarding fiduciary distribution of the money in the Tronox settlement for the cleanup of mines (for more information on this settlement, see Section D. Unique Situation: Tronox in the strategic plan). NMED and MMD are participating in the discussions regarding the Tronox settlement and NRC jurisdiction.

RAML held a National Pollution Discharge Elimination System Permit No. NM0020532 to discharge mine drainage, surface and groundwater reclamation wastewater, and stormwater from the Ambrosia Lake mining area.

Anticipated Funding Requirements

Funding for all site reclamation, abatement, remediation, and long-term monitoring actions regulated by NMED and EMNRD-MMD are covered by RAML, the responsible party for Sections 17, 22, 24, 30, 30W, 33, 35, and 36 mines. The Office of Natural Resources Trustee is working with RAML to develop an approach for a cooperative natural resource damage assessment and an evaluation of restoration options to compensate for any identified resource injuries and service losses caused by releases of hazardous substances at the site. This work will be separate from all permitting activities that NMED and MMD conduct. NMED and EMNRD-MMD jointly hold financial assurance totaling $89,340,000.

Disclaimer

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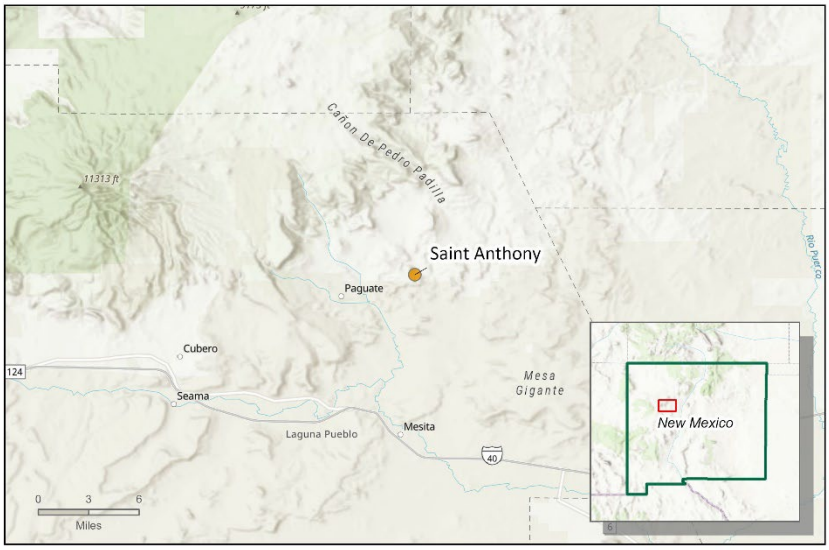
St. Anthony Mine Site Review

Location

The St. Anthony Mine site is located in the Grants Uranium District, Laguna subdistrict, 31 miles east of Grants, New Mexico, in Cibola County. It is located within Township 11 North, Range 4 and 5 West, at the base of the northern and eastern slopes of the Gavilan Mesa. The mine is located on the Cebolleta Land Grant.



Ownership and History

St. Anthony Mine and all surface and mineral rights are owned by the Cebolleta Land Grant, administered by a Board of Trustees, and were leased to the United Nuclear Corporation (UNC), which is a wholly owned subsidiary of General Electric, for mining purposes from February 1964 until they surrendered it through a Release of Mineral Lease in October 1988. UNC is responsible for reclamation and groundwater abatement of the St. Anthony Mine pursuant to a Mining Act Permit and abatement plan with the New Mexico Environment Department (NMED).

Records indicate uranium was mined at the St. Anthony Mine through an underground mine operation starting around the site discovery in 1955 and up until the early 1960s by the Anthony Uranium Company, a division of Climax Molybdenum Company (additional information on the underground mine operation is not available). UNC then operated the site from 1975 through 1981. UNC performed mining using underground and surface methods. UNC initiated open pit mining in November 1975 and continued until August 1980. Two open pits were mined; one large (referred to as Pit 1) and one small (referred to as Pit 2). The large open pit is approximately 1,900 feet in diameter. It extends into the ore-bearing Jackpile Sandstone unit of the Morrison Formation and intercepts groundwater. The small pit is 700 feet in diameter, and it does not intercept groundwater or the targeted ore body. The St. Anthony Mine also includes an underground mine with a 357-foot shaft that extends into the Jackpile Sandstone. Shaft construction began in January 1977 and underground mining ceased in June 1980. From 1975 to 1980, the mine produced approximately 1.6 million pounds of uranium ore. Mining operations left one mine shaft and one vent shaft (both capped at the surface in 1984 and 1985, respectively), two open pits, several waste rock piles, three topsoil or overburden piles, building and shaft pads, and former settling ponds. Stockpiled ore from the St. Anthony Mine was processed off site primarily at the UNC Church Rock Mill near Gallup, New Mexico.

Reclamation and Regulatory Jurisdiction

UNC is the responsible party for the St. Anthony Mine site and is responsible for all abatement and reclamation actions. There is no groundwater discharge permit associated with the site, but the site is regulated under the abatement rules in New Mexico Administrative Code 20.6.2. The site also is regulated under a Mining Act Permit with the New Mexico Department of Energy, Minerals, and Natural Resources (EMNRD) Mining and Minerals Division (MMD).

Regulatory Tracks

- No discharge permits are registered with NMED.
- Under NMED, the St. Anthony Mine is regulated under an abatement plan, which addresses remediation of groundwater impacts, and long-term groundwater monitoring.
- Under EMNRD-MMD, the St. Anthony Mine is regulated under a Mining Act Permit, which addresses surface reclamation.

NMED

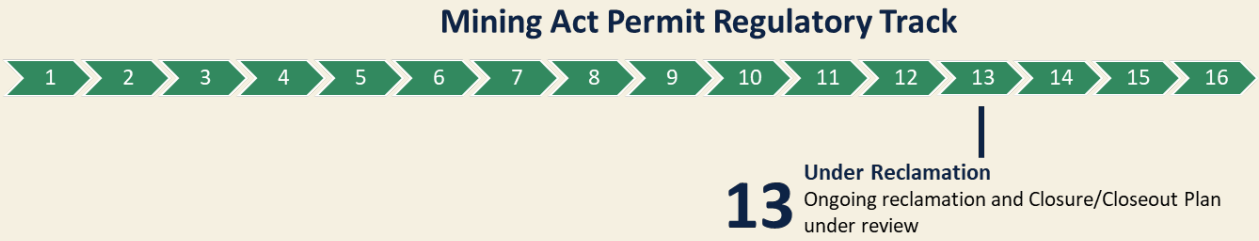
Uranium mining at the site was conducted in accordance with the then-current regulations and industry standards. After some initial investigations, NMED required UNC to submit a Stage 1 Abatement Plan in January 2002. UNC submitted the Stage 1 Abatement Plan in August 2002, and it was approved with conditions by NMED in November 2002. The Stage 1 Abatement Report was submitted in October 2006, and later approved after a series of communications between NMED and UNC. In November 2008, UNC submitted the Stage 2 abatement workplan. The Stage 2 abatement work progressed, and a revised report was submitted and subsequently approved in April 2012. A final Stage 2 Abatement Plan Report was submitted in September 2014, and later revised in February 2015 with conditional approval in May 2015. An Alternative Abatement Standards Petition was submitted in July 2017, initiating a hearing. UNC completed abatement activities in 2018 and the Water Quality Control Commission (WQCC) approved Alternative Abatement Standards and issued a Final Order that outlined the reclamation remedy to be a complete backfill of the large pit, as well as a well prohibition from the Office of the State Engineer.

After a series of meetings between UNC, NMED, and MMD from 2020-2022, it was determined that UNC did not intend to follow the approved abatement remedy of full backfill of the large pit. NMED directed UNC to submit a Stage 2 Abatement Modification and revised Closure/Closeout Plan in 2022. The Stage 2 Abatement Modification is currently under review by NMED. MECS staff are exchanging information with the permittee and approval of Closure Plan will not be final until MMD determines that the Closeout Plan is technically complete.

EMNRD-MMD

The St. Anthony Mine is in full reclamation status. As part of the Stage 2 Abatement Plan Modification, UNC also submitted a Closure/Closeout Plan (CCP) to both NMED and MMD to satisfy the requirements of sitewide closeout under the Mining Act. Currently, the MMD Permit is in process with the submitted CCP under review. MMD sent the first round of comments on the CCP to the operator in May 2023. In August 2023, MMD received the

mine operator's response to the first round of comments. MMD sent the second round of comments on the CCP to UNC in February 2024 with UNC responding in July 2024. MMD and UNC will continue the permitting process. The St. Anthony Mine site is designated under Mining Act Permit No. MK006RE.



Timelines for Completing Cleanup Activities

The CCP has been submitted with the first round of MMD and EMNRD comments sent to UNC. More discussion and rounds of comments will be needed to determine that the CCP is technically approvable, and the Mining Act Permit can be issued. Once the Mining Act Permit is issued, the current plan submitted by UNC includes a half year of contracting and three years of construction before completion of the project. A minimum of 12 years of monitoring will be required by MMD before the Mining Act Permit can be released, which is contingent upon a demonstration that UNC is meeting the standards under the Mining Act.

NMED is reviewing the Stage 2 modification and will require additional information prior to determining that the remedy as proposed will protect human health and the environment. This process will likely involve numerous rounds of comments between UNC and NMED prior to any approval of the Stage 2 modification. After the Stage 2 modification is approved by NMED, UNC will need to petition the WQCC to modify the Final Order and implement additional Alternative Abatement Standards. The WQCC will hold a hearing to address the modification to the Stage 2 Abatement Plan. NMED will require groundwater monitoring to continue on the site.

Coordination Between State and Federal Agencies

St. Anthony Mine is regulated by two New Mexico agencies: NMED and EMNRD-MMD. Office of the State Engineer (OSE) has been closely involved with a closure plan for the shafts. St. Anthony Mine is not regulated by the U.S. Nuclear Regulatory Commission nor the U.S. Department of Energy. There are no federal agencies regulating this site. Therefore, coordination with federal agencies is not anticipated due to unconnected regulatory jurisdiction.

Anticipated Funding Requirements

Funding for all site reclamation, abatement, remediation, and long-term monitoring actions regulated by NMED and EMNRD-MMD are covered by UNC, the responsible party for the St. Anthony Mine site. Additionally, jointly held financial assurance between NMED and EMNRD-MMD—totaling $97,759,617—is in place for cleanup activities in the event of a forfeiture. There is no anticipated funding needed from the state or other entity for St. Anthony Mine. UNC is responsible for all costs associated with closure and abatement.

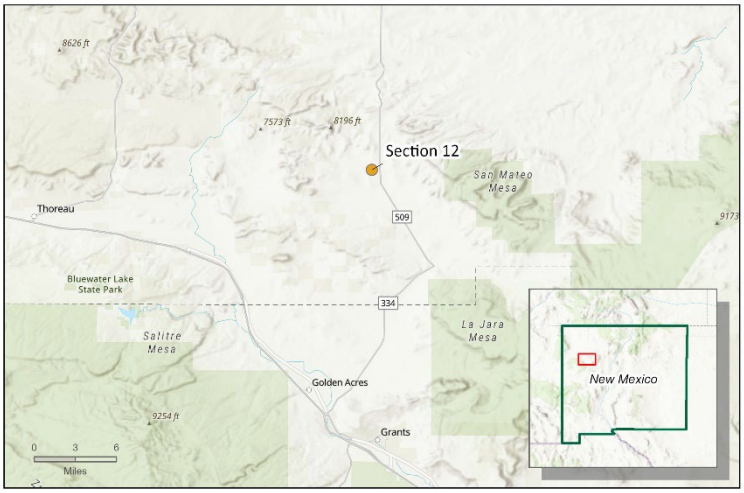
Disclaimer

Site reviews in this report provide the reader with a general history and status of permitted mines and mills. For brevity, they may not provide all relevant details or agency actions related to each site.

Section 12 Mine Site Review

Location

The Section 12 Mine is located in the southwest quarter of Section 12, Township 14 North, Range 10 West, and the Northeast quarter of Section 11, Township 14 North, Range 10 West, in McKinley County, New Mexico. The site is adjacent to the ephemeral Ambrosia Lake in the Ambrosia Lake mining district and 27 miles north of the nearest town of Milan, New Mexico.



Ownership and History

Cobb Resources Corporation operated this underground uranium mine intermittently in 1959 and 1962, and from 1974 to early 1982. The mine is currently inactive and is owned by Empire Trust, Inc., on behalf of Southwest Resources, Inc. (SRI). The financial interests, including reclamation of the Section 12 Mine, are being managed by Empire Trust, Inc. The mine property includes a mine building, hoist house, a main shaft, and two subsidiary vent shafts without headframes; piles of waste rock that contain low-grade uranium mineralization; piles of rock mineralized with uranium that were intended for milling; and soils contaminated by uranium mineralization. The mine property also contains roads, drainage ditches, and miscellaneous mining equipment. The Section 12 Mine is under the jurisdiction of New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) Mining and Mineral Division (MMD) with Mining Act Permit No. MK046RE that is discussed below.

Reclamation and Regulatory Jurisdiction

NMED

All Section 12 site cleanup activities are regulated under EMNRD-MMD with review of the Reclamation Plan by the New Mexico Environment Department (NMED). Although the site is adjacent to the ephemeral Ambrosia Lake, the mine was operated as a dry mine, and encountered no groundwater during operations, so no discharge permit was issued for the mine.

Regulatory Tracks

- No discharge permits or abatement plans are registered with NMED.
- The Section 12 Mine site holds a Mining Act Permit No. MK046RE (Director's Order).

EMNRD-MMD

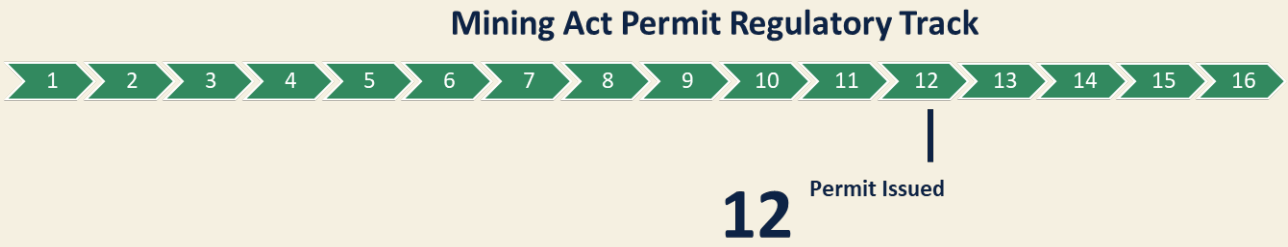
SRI applied for a minimal-impact mine permit from EMNRD-MMD in January 2014. The application was denied, and under the New Mexico Mining Act (Title 19, Chapter 10, New Mexico Administrative Code [NMAC] 19.10.5), the mine was classified as a regular existing mine, subject to the requirements in Part 5 of the act. Subsequently, SRI performed an economic analysis of the mine and determined that, considering the current uranium market and the limited remaining uranium resources, the mine owner would not be operating in the future, would not seek a mine permit, and is currently undertaking reclamation of the Section 12 Mine.

Following SRI's decision not to seek a mine permit under 19.10.5 NMAC, MMD issued a draft Order of Abatement on Consent that SRI prepare a Conceptual Reclamation Plan (CRP). The CRP was submitted in July 2019 and MMD provided comments on the CRP to SRI in August 2019, which required SRI to prepare a Final Reclamation Plan (FRP). The FRP was submitted in compliance with the MMD Director's Order of Abatement on Consent (AOC) issued in December 2019 by MMD and signed by Empire Trust, Inc., in January 2020. The order requires the FRP to satisfy requirements for a closeout plan under NMAC 19.10.5.506 and responds to the environmental standards of the MMD/NMED *Joint Guidance for the Cleanup and Reclamation of Existing Uranium Mining Operations in New Mexico*. The goal is for the site to be fully reclaimed. Currently, this site has an approved FRP associated with the draft order.

The Section 12 Mine reclamation objectives are:

- Satisfaction of the *State of New Mexico Radiation Cleanup Criteria* in Section 2 of the *Joint Guidance for the Cleanup and Reclamation of Existing Uranium Mining Operations in New Mexico* (MMD/NMED, 2016).
- Satisfaction of the requirements under NMAC 19.10.5.506A & B, 507A.
- Satisfaction of the requirements under paragraph 32 of the AOC.

Some removal actions have occurred in accordance with the AOC issued in January 2020, but no reclamation has occurred to date. Lack of funds and the Empire Trust being tied up in litigation with the estate has slowed reclamation actions. The Section 12 Mine site holds a Mining Act Permit No. MK046RE (Director's Order). The next step in the Mining Act Permit regulatory track for Section 12 Mine is step 13, where the site is under reclamation.



Timelines for Completing Cleanup Activities

The estimated timeline for cleanup per the regulating agency (EMNRD-NMD) is approximately five years.

Coordination Between State and Federal Agencies

The Section 12 Mine site is regulated by EMNRD-MMD with NMED in a supporting role. Section 12 Mine is not regulated by the U.S. Nuclear Regulatory Commission nor the U.S. Department of Energy. There are no federal agencies regulating this site. Coordination with federal agencies is not anticipated due to unconnected regulatory jurisdiction at this site.

Anticipated Funding Requirements

Funding for all site reclamation, abatement, remediation, and long-term monitoring actions regulated by EMNRD-MMD is covered by Empire Trust on behalf of SRI, the responsible party for the Section 12 Mine.

There is no anticipated funding needed from the state or other entity for Section 12 Mine. Empire Trust on behalf of SRI is responsible for all costs associated with closure and abatement, but there is no Financial Assurance currently held by EMNRD-MMD or NMED.

It is worth noting that Empire Trust may run out of money in the SRI Trust Fund before all reclamation is complete for this site.

Disclaimer

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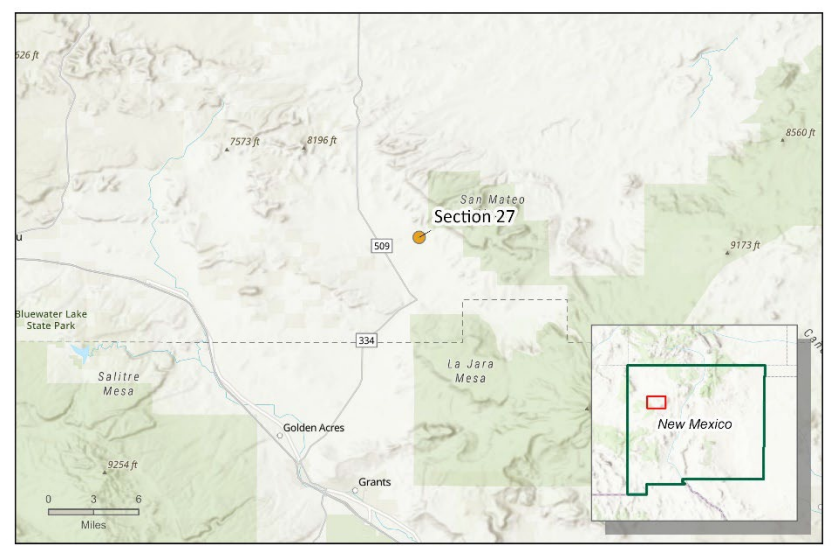
Section 27 Mine Site Review

Location

The Section 27 Mine site is located in Section 27, Township 14N, Range 9W of the New Mexico Principal Meridian and is approximately 17 miles north of Milan, New Mexico.



Ownership and History

The United Nuclear Corporation (UNC) operated the Section 27 Mine as an underground uranium mine between 1970 to 1977. The Section 27 Mine was an underground, conventional room-and-pillar mine that intercepted groundwater. Pumping groundwater was required to develop the underground mining operation. The mineral lease covered approximately 200 acres. A private party holds surface ownership at the mine and Hecla Mining Company holds ownership of the mineral estate. UNC surrendered the mineral lease in 1988 and conducted closure activities in the same year. However, the owner of the leased portion of the site did not provide UNC permission to conduct reclamation on the leased areas. In 1996, UNC was acquired by General Electric (GE), and UNC continues to oversee the reclamation of its former sites, including the Section 27 Mine (pending access).

Reclamation and Regulatory Jurisdiction

Initial Reclamation Work

UNC conducted initial closure activities of the Section 27 Mine in 1988, which included removing stockpiled ore, buildings, and machinery, as well as sealing shafts and vents. UNC also conducted voluntary reclamation activities at all of UNC's land holdings in Section 27, except on the leased lands where access to the site has been denied by the landowner.

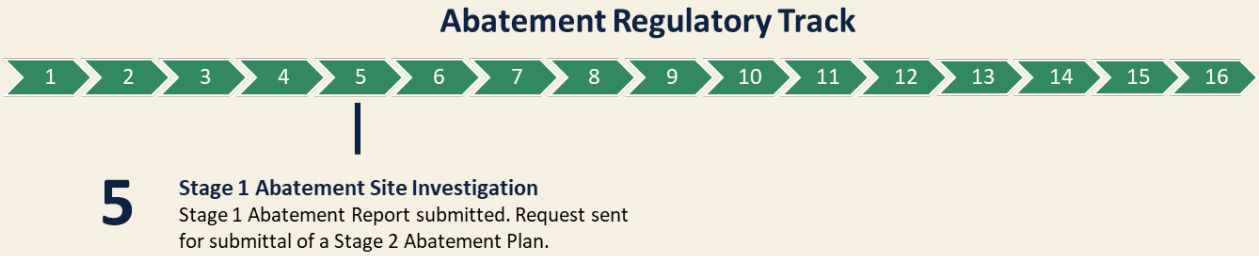
Regulatory Tracks

- No discharge permits are registered with NMED.
- Under NMED, the Section 27 Mine is regulated under an abatement plan, which addresses remediation of groundwater impacts, and long-term groundwater monitoring.
- UNC/GE is required to submit a Supplemental Closeout Plan.

NMED

In August of 2004, the New Mexico Environment Department (NMED) sent a letter to UNC that an Abatement Plan was required for the Section 27 Mine Site. The decision was based on water quality results and site inspections conducted from 1997 to 2004 that indicated that groundwater was impacted. Between November 2005 and September 2006, UNC drafted and finalized the Stage 1 Abatement Plan Proposal. On October 13, 2006, NMED conditionally approved the work plan in the proposal.

The Stage 1 Abatement Plan Proposal was fully approved February 12, 2010. Additionally, the company submitted annual reports for five years (2010 to 2015) and requested an adjustment to the approved sampling program, for which they received NMED's approval in June 2015. In the 2019 annual groundwater report, UNC stated groundwater monitoring would not continue. NMED responded in a letter dated January 12, 2021, that monitoring shall continue as approved. Communications between NMED and UNC on abatement began again with a letter dated October 14, 2022. In the letter, NMED requested UNC submit a Stage 2 Abatement Plan proposal. Negotiations between NMED and UNC continue on the submittal of a Stage 2 Abatement Plan Proposal.



EMNRD-MMD

In July 2003, the New Mexico Department of Energy, Minerals, and Natural Resources (EMNRD) Mining and Minerals Division (MMD) received a Permit Application and Site Assessment from UNC followed by the submittal of a Closeout Plan in January 2004. Based on MMD and EMNRD comments, UNC submitted a Revised Closeout Plan to MMD in August 2008 and a Supplement to the Closeout Plan in November 2008. MMD approved a reclamation-only permit (Mining Act Permit No. MK005RE) including the Closeout Plan in October 2009. In April 2010, UNC initiated reclamation in accordance with the approved Closeout Plan.

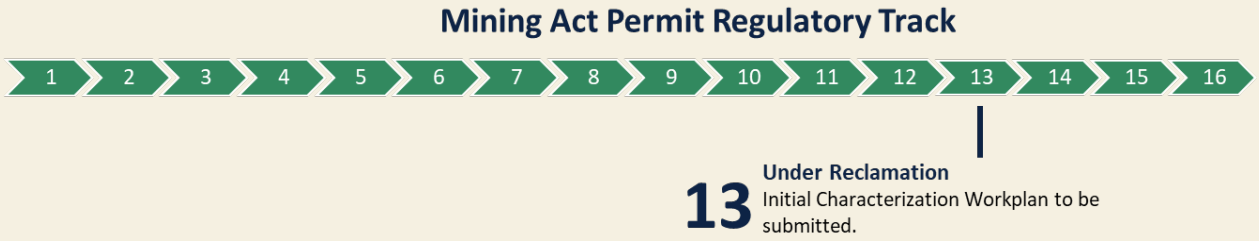
In May 2010, MMD discovered additional surface radiological contamination within, outside, and adjacent to the permit boundary that was not characterized in the previous site assessments. In June 2010, MMD sent a letter to UNC requiring the Closeout Plan be amended to reclaim the additional radiologically contaminated areas consistent with the Reclamation Plan for the ore and ball mill reject piles. In an August 2010 letter, UNC rejected MMD's request to amend the Closeout Plan for the additional radiologically contaminated areas. MMD sent a letter to UNC in September 2010 stating that if UNC did not amend the Closeout Plan that MMD would issue an appropriate order to comply. In October 2010, MMD received a letter from MWH Global Inc. on behalf of UNC including a Post-Reclamation Risk Evaluation for the Section 27 Mine that was followed by a letter in June 2011 with a Supplemental Characterization Survey Results Report. Also in June 2011, UNC applied for permit modification including a Supplemental Closeout Plan to MMD. MMD deemed the application administratively complete and began a technical review of the application under Modification 11-1. In March 2016, MMD and NMED drafted a "Joint Guidance for the Cleanup and Reclamation of Existing Uranium Mining Operations in New Mexico" (Joint Cleanup Guidance). The Joint Cleanup Guidance Radiation Cleanup Criteria for Existing Uranium Mines mirrors the U.S. Environmental Protection Agency's Uranium Mill Tailings Radiation Control Act "5/15 standard."

In February 2018, MMD sent UNC comments on the Supplemental Closeout Plan indicating that UNC should revise the plan to meet the Joint Cleanup Guidance Radiation Cleanup Criteria. In

June 2018, UNC sent a letter in response to comments MMD made on the plan. UNC refused to apply the Joint Cleanup Guidance to the Supplemental Closeout Plan with respect to soil cleanup levels.

In a letter dated July 20, 2023, UNC agreed to submit a Supplemental Characterization Workplan for Surface Reclamation, to be conducted under a Supplemental Closeout Plan. The reclamation goal is to fully release permits with completed groundwater abatement and long-term monitoring. Currently, an updated Closeout Plan is needed for the next step.

MMD is currently awaiting submittal of a Supplemental Closeout Plan for this site that is in accordance with the Joint Guidance for the Cleanup and Reclamation of Existing Uranium Mining Operations in New Mexico. UNC has agreed to submit the initial Characterization Workplan as a next step in this process. This workplan is currently due according to the schedule UNC provided, but it has not been submitted to MMD as of the writing of this report.



Timelines for Completing Cleanup Activities

NMED and MMD are working with UNC to develop a path and implementation schedule for outstanding activities at the site.

Coordination Between State and Federal Agencies

The Section 27 Mine is predominately regulated by two New Mexico agencies: NMED and EMNRD-MMD. The mine is not regulated by the U.S. Nuclear Regulatory Commission nor the U.S. Department of Energy.

Anticipated Funding Requirements

Funding for all site reclamation, abatement, remediation, and long-term monitoring actions regulated by NMED and MMD are covered by UNC, the responsible party for the Section 27 Mine. There is no anticipated funding needed from the state or other entity for the Section 27 Mine. UNC is responsible for all costs associated with closure and abatement. MMD holds $377,000 of financial assurance on this site.

Disclaimer

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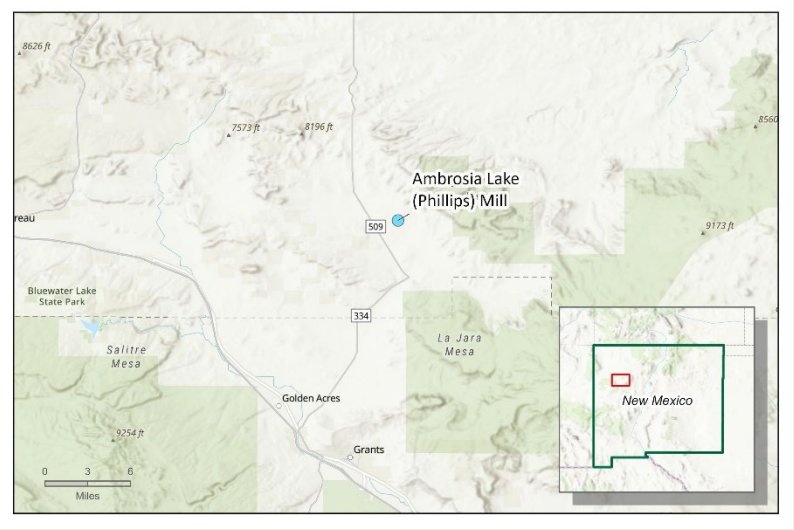
Appendix B. Former Mill Site Reviews

Ambrosia Lake Disposal Site Review

Location

The Ambrosia Lake Disposal site is located in McKinley County, approximately 25 miles north of Grants, New Mexico. The site is within the Ambrosia Lake Mining District, near the Grants Mineral Belt.



Ownership and History

The Ambrosia Lake Disposal site is a former uranium processing mill originally built by Phillips Petroleum Company in 1957 to process uranium from nearby mines. The United Nuclear Corporation purchased the mill in 1963 and ceased milling operations but retained ownership. From the 1970s to early 1980s, United Nuclear Corporation operated an ion exchange system at the site, extracting uranium from mine water. Mill operations ceased in 1982 and left behind contaminated materials (primarily radioactive mill tailings) on 111 acres. Erosion via wind and water spread the tailings across 230 acres of the site.

The U.S. Department of Energy Office of Legacy Management (DOE-LM) manages the site according to a site-specific Long-Term Surveillance Plan (LTSP). The site is included under a U.S. Nuclear Regulatory Commission (NRC) general license for Uranium Mill Tailings Radiation Control Act of 1987 (UMTRCA) Title I sites. UMTRCA Title I—regulated under Title 10 Code of Federal Regulations (CFR) Part 40.27—authorized the remediation of uranium mill tailings sites inactive prior to the law's enactment in 1978. Remediation activities took place under the Uranium Mill Tailings Remedial Action Project in accordance with standards set by the U.S. Environmental Protection Agency (EPA) in Title 40 CFR (Health and Environmental Standards for Uranium and Thorium Mill Tailings) Part 192.

Reclamation and Regulatory Jurisdiction

DOE conducted surface remediation at the site and in contaminated areas around the site between 1987 and 1995. Remediation activities included decommissioning the mill facilities as well as consolidating and encapsulating all contaminated materials on site in the disposal cell. The disposal cell, which covers 91 acres and holds 6.9 million dry tons of contaminated material, closed in 1995.

As mentioned above, DOE remediated 22 inactive uranium ore processing sites under the Uranium Mill Tailings Remedial Action Project in accordance with standards in Title 40 CFR Part 192, which establishes standards for protecting public health, safety, and the environment from radiological or non-radiological hazards associated with uranium and thorium ore processes, as well as their associated wastes. Subpart B of 40 CFR Part 192 regulates cleaning up contaminated groundwater at the mill sites. Radioactive tailings were encapsulated at the site in NRC-approved disposal cells.

Supplemental standards apply at UMTRCA sites where groundwater in the uppermost aquifer is classified as limited-use by meeting any of several criteria. According to NRC regulation, groundwater at the Ambrosia Lake site meets the criterion of low yield, meaning the quantity of water reasonably available for sustained continuous use is less than 150 gallons a day (40 CFR Part 192.11[e]). Groundwater is not a potential resource here and, therefore, no groundwater monitoring is required at the site according to DOE-LM. However, DOE-LM samples groundwater from three monitoring wells every three years to monitor disposal cell performance in accordance with a request from the New Mexico Environment Department and within the LTSP.

Timeline for Completing Cleanup Activities

The DOE-LM remediated the site and the surrounding contaminated areas between 1987 and 1995. Surface remediation consisted of consolidating and encapsulating all contaminated material on site in the existing tailings disposal cell. Reclamation (excluding groundwater cleanup) is considered complete at this site. However, the DOE-LM manages the site according to a site-specific LTSP to ensure the disposal cell systems continue to prevent the release of contaminated materials. As part of the LTSP, DOE-LM conducts annual inspections of the site, performs maintenance as necessary, and samples three monitoring wells every three years.

In accordance with 40 CFR Part 192.02(a), the disposal cell is designed to be effective for 1,000 years, to the extent reasonably achievable, and for at least 200 years in any case. The NRC general license for UMTRCA Title I sites has no expiration date and DOE-LM's responsibility for the site will last indefinitely.

Coordination Between State and Federal Agencies

The DOE-LM is the primary regulator and manager of the site and monitors disposal cell performance in accordance with a request from New Mexico Environment Department and under the NRC general license provisions discussed above.

Anticipated Funding Requirements

DOE is the responsible party for the site and is therefore responsible for funding any remediation, cleanup, or monitoring activities at the site.

Disclaimer

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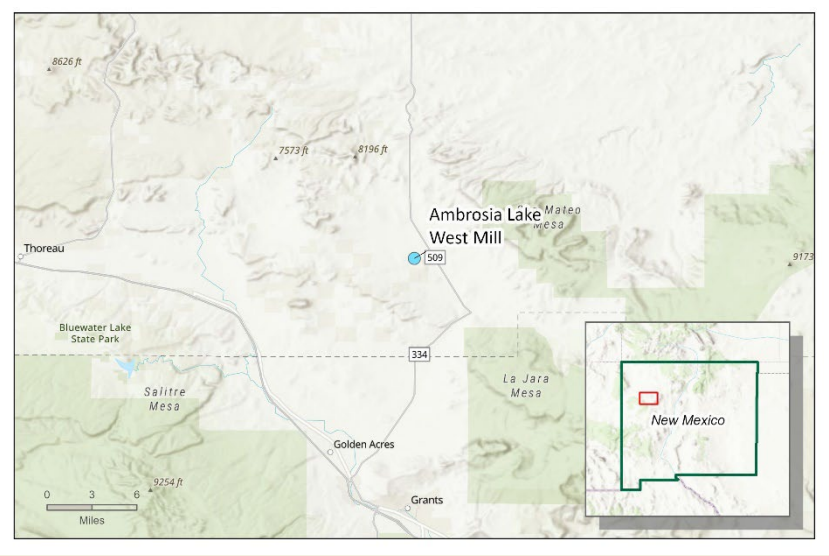
Ambrosia Lake West Mill Site Review

Location

The Ambrosia Lake West (ALW) Mill site is located in the Ambrosia Lake uranium district of New Mexico. The site is located approximately 25 miles north of Grants, New Mexico.



Ownership and History

The Kermac Nuclear Fuels Corporation built the ALW mill site in 1957. It originally consisted of the mill site, uranium mill tailings ponds, and associated outlying evaporation ponds. The mill processed more than 3 million tons of uranium ore between 1958 and 1963. Uranium ore processed at this mill was mined at Sections 17, 22, 24, 30, 30W, 33, 35, and 26 mine sites, which were also owned and operated by the Kermac Nuclear Fuels Corporation. The two unlined tailings impoundments contain 33 million tons of uranium ore byproduct material and construction debris and cover approximately 370 acres. Rio Algom Mining, LLC (RAML) acquired the site in 2001 and remains the responsible party for the site.

The primary regulating agencies for the site are the U.S. Nuclear Regulatory Commission (NRC) and New Mexico Environment Department (NMED). Active permits at the site include NRC site-specific license No. SUA-1473 and NMED groundwater discharge permits (DPs) DP-71 and DP-169.

Reclamation and Regulatory Jurisdiction

In 2003, the site status under the NRC changed from standby status to reclamation in order to begin full mill decommission and reclamation of the site. In late 2003, RAML demolished the mill and disposed of scraps in the tailings impoundment. Mill tailings generated during the mill's operational period were disposed of within the footprint of historical ponds 1 and 2. Disposal cell 1, which overlies historical pond 1, was completed in 1998, and contains approximately 30 million tons of uranium mill tailings covering 260 acres. Disposal cell 2, which overlies historical pond 2, was completed in 2016 and contains approximately 3 million tons of uranium mill tailings covering 90 acres. Soil contaminated with windblown tailings and other material that is regulated by the NRC is expected to be placed in another disposal cell yet to be constructed.

There are a total of 21 historical ponds on the site, but no ponds are present at the site today (all are closed, with liners removed and initial surface soil cleanup complete). Historical ponds 4 through 10 were reclaimed using the site's alternate release criteria under the NRC remedy, which requires the application of clean fill and a rock cover to stabilize residues in the ponds and maintain contamination at levels that are as low as reasonably achievable and less than the

resulting dose from exposure to radionuclides at the concentrations stipulated in Criterion 6(6) of Title 10 Code of Federal Regulations Part 40, Appendix A. The alternate release criteria method is only used in areas of the site where permanent institutional controls will be maintained. In 2017, RAML submitted a dose assessment to the NRC that demonstrated concentrations of tailings byproduct material within the historical pond footprint were as low as reasonably achievable.

In addition to the NRC license, there are multiple NMED groundwater discharge permits associated with both the ALW Mill, including DP-71 and DP-169. NMED issued DP-71 in August 1979, and the permit had timely renewals through 2008. DP-71 is active because it has been administratively continued while jurisdiction is determined with NRC. DP-71 encompassed operational and closure activities for the Section 4 ponds area. The Section 4 ponds area included ponds 11 through 21, which contained a variety of mine- and mill-related discharges. Groundwater monitoring under DP-71 includes alluvial and bedrock aquifers. DP-71 is also in groundwater abatement. DP-169 was issued in March 1981, and has timely renewals through 2009. DP-169 is active and has been administratively continued while jurisdiction is determined with NRC. DP-169 encompasses the operational and closure aspects of the ALW Mill site and its related discharges. Groundwater abatement began under DP-169 with a letter dated October 2010. Ongoing permitted activities under DP-169 include groundwater monitoring of the alluvial and bedrock aquifers, reporting requirements, and investigations of site impacts to groundwater.

Under the NRC, ALW decommissioning is complete, but reclamation is ongoing as closure activities remain underway. Windblown sediments still need to be collected and placed in a new (not yet constructed) disposal cell, and other areas within the license boundary still need different levels of cleanup, as well as ongoing groundwater monitoring.

The NRC approved a groundwater corrective action program for ALW in 1989. Aspects of the program included pumping and capturing impacted groundwater through pumps from the nearby underground mine workings and interceptor trenches, removing impacted sediments from the ponds, and removing the liquid component remaining within the tailings impoundments. RAML submitted an alternate concentration limit petition for the site's alluvial and bedrock groundwater that was impacted by milling activities to the NRC in 2000. The NRC approved the alternate concentration limits in 2006 and RAML ceased its corrective action program to begin its groundwater stability monitoring program, which is ongoing.

Timeline for Completing Cleanup Activities

The NRC estimates the site with close in 2032. RAML terminated the site environmental monitoring program in 2017, with the exception of radon monitoring and groundwater monitoring (RAML conducts groundwater monitoring for both NMED and NRC and conducts other monitoring for NRC).

Coordination Between State and Federal Agencies

The NRC and NMED are the primary regulating agencies for this site. NRC is focusing on the extent of windblown soil and other mill-related impacts on and off site and NMED is focusing on the groundwater impacts at the mill site and related mine sites. For details on the mine sites, see Appendix A.

Anticipated Funding Requirements

RAML is the responsible party for the site and is responsible for funding cleanup and long-term operations and management. According to the NRC, the cost for decommissioning is estimated to be approximately $20 million.

Disclaimer

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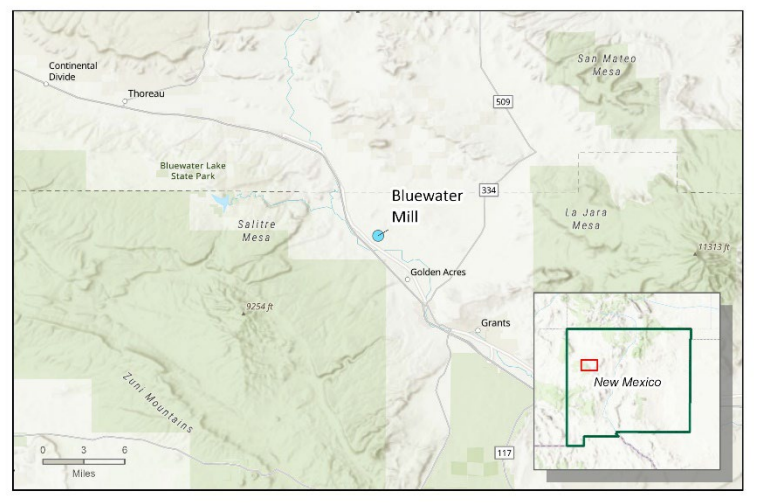
Bluewater Mill Site Review

Location

The Bluewater Mill site (also referred to as the Bluewater disposal site) is located in Cibola County, roughly 9 miles northwest of Grants, New Mexico, and roughly 6 miles northwest of Milan, New Mexico.



Ownership and History

The Bluewater mill was originally constructed by the Anaconda Copper Company as a carbonate-leach mill in 1953 to process uranium ore that was mined nearby. In 1957, an acid-leach mill was constructed to process sandstone uranium ore from the Jackpile-Paguate mine, north of Laguna Pueblo. The carbonate-leach mill closed, and the acid-leach mill reduced production due to economic conditions in 1959, but the acid-leach mill resumed full operations again in 1967. As of 1978, the acid-leach mill's capacity increased to 6,000 tons of ore per day. In 1977, the Anaconda Copper Company became a subsidiary of the Atlantic Richfield Company (ARCO).

The U.S. Department of Energy Office of Legacy Management (DOE-LM) currently manages the site under Title II of the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). Title II of UMTRCA authorized the regulation of commercial uranium mills operating on or after 1978.

Reclamation and Regulatory Jurisdiction

The Bluewater mill is under the jurisdiction of Title II of UMTRCA, which applies to uranium mill sites which were under active U.S. Nuclear Regulatory Commission (NRC) licenses when UMTRCA was enacted. Title II of UMTRCA stipulates that after reclamation is complete, the federal government or the host state is responsible for the long-term custody of the site. The DOE-LM assumed responsibility for the Bluewater site.

ARCO began decommissioning the mill in 1989 and began reclamation in 1991. All mill tailings, contaminated soils, demolished mill structures, and any additional contaminated materials were encapsulated in onsite disposal areas by 1995. The main unlined tailings disposal cell covers approximately 354 acres and contains an estimated 23 million tons of tailings and other contaminated materials. The carbonate tailings disposal cell covers approximately 54 acres and contains an estimated 1.3 million tons of contaminated materials. The carbonate disposal cell contains carbonate mill process tailings. Acid mill process tailings are in the main disposal cell. Neither cell had a liner. After some time, groundwater at the site showed elevated concentrations in constituents as a result of tailings liquid seeping into the alluvial and bedrock units below the ground surface. In an attempt to reduce the impact, Anaconda Copper Company drilled an injection well into the Yeso formation and pumped the fluids from the main tailings impoundment between January 1960 and December 1965. Contaminated water moved upward into the San Andres Glorieta (SAG) aquifer from the Yeso formation below. The SAG is the main groundwater source for the region and supplied the process water needed for mill operations. In

1990, ARCO applied to the NRC for alternate concentration limits (ACLs). ACLs are alternative compliance values adopted when established maximum concentration limits are unable to be met, providing that the proposed ACL does not pose a present or potential future hazard to human health or the environment. The NRC approved ARCO's ACL in 1996 and the New Mexico Environment Department (NMED) subsequently terminated its permits on the site. The site was transferred to DOE-LM for long-term care and maintenance in 1997. A Long-Term Surveillance Plan (LTSP) dictates the actions of DOE-LM.

As part of the compliance strategy, the groundwater monitoring network consists of 19 wells located inside the Bluewater site boundary where samples of the main constituents of concern are analyzed semiannually. In addition to the main tailings disposal cell and the carbonate tailings disposal cell, there are three other engineered disposal structures adjacent to the carbonate tailings disposal cell to contain contaminated material from milling activities.

Title II of UMTRCA also stipulates that the site licensee (ARCO in this case) is responsible for remedial action. ARCO encapsulated the tailings in two disposal cells and other contaminated materials in disposal areas meeting NRC design requirements. NRC's cleanup and reclamation standards are codified in Title 10 Code of Federal Regulations (CFR) Part 40, Appendix A. The standards comply with NRC-approved ACLs. NRC issued the site the general license for UMTRCA Title II sites (10 CFR 40.28) and transferred it from ARCO to DOE-LM for long-term custody in 1997. ARCO is not considered a responsible party at this site.

Timeline for Completing Cleanup Activities

DOE-LM manages the disposal site according to a site-specific LTSP to ensure the disposal cells continue to protect against contaminants releasing into the environment (DOE-LM is currently updating this plan to reflect current site conditions). DOE-LM conducts annual inspections of the site to evaluate the conditions of surface features, performs site maintenance, and monitors groundwater to ensure contaminated groundwater is not released in concentrations greater than those approved in the ACL agreement and stated in the LTSP.

The reclamation for the site is complete. In accordance with 40 CFR 192.32, the disposal cells are designed to be effective for 1,000 years, to the extent reasonably achievable, and for at least 200 years in any case. The general license has no expiration date, and DOE-LM's responsibility for the site will last indefinitely.

Coordination Between State and Federal Agencies

NMED works with DOE-LM on site monitoring and repair activities.

Anticipated Funding Requirements

The DOE-LM is the responsible party for the site and is therefore responsible for funding remediation and cleanup activities.

Disclaimer

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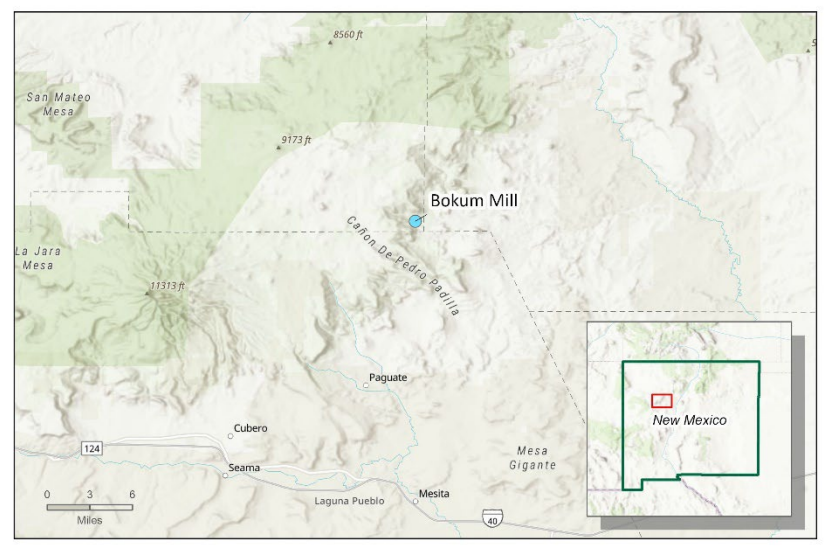
Bokum Mill Site Review

Location

The former Bokum Mill site is located in the Marquez sub-district of the Grants Mining district, approximately 41 miles northwest of Albuquerque.



Ownership and History

In 1977 Bokum Resources Corporation announced it had undertaken planning for a uranium processing mill at a Marquez, New Mexico, property. The State of New Mexico assumed regulatory responsibility for uranium mills within its borders in 1974, which meant Bokum Resources' Marquez Mill (or Bokum Mill) was originally regulated by the state. In 1981, prior to any operations at the site beginning, ten creditors of Bokum Resources filed a petition in the U.S. Bankruptcy Court seeking a reorganization of the company. In 1982, the District Court of New Mexico upheld a case—*In Re Bokum Resources Corp.*, 26 B.R. 615 (D.N.M. 1982)— placing Bokum Resources into involuntary bankruptcy due to having more than three creditors with unpaid debts.

In 1986, the State of New Mexico returned regulatory responsibility for uranium mills to the U.S. Nuclear Regulatory Commission (NRC). All New Mexico mill licensing records then transferred to the NRC's Uranium Recovery Field Office in Colorado and were made public in 1998. The New Mexico documents were part of about 20,000 Title I and Title II records that previously were not publicly available. Records for the Bokum Mill remain largely inaccessible since most of the historical documents are on microfiche. Microfiche collections are at the NRC Public Document Room in Rockville, Maryland, and at some former NRC Local Public Document Rooms. A list of the docketed materials for Bokum Resources is available through the NRC's website.

The Bokum Mill construction began with the expectation that uranium ore from nearby mines would be milled. However, as the price of uranium declined in the early 1980s, mining ceased and the mill was never put into operation. Construction of the mine and mill was never completed, and neither facility was ever operated. Bokum Resources later dismantled the site.

The NRC terminated its source material license following multiple site inspections in 1988 and confirmed that uranium ore was never processed or produced at Bokum Mill.

Reclamation and Regulatory Jurisdiction

Not applicable.

Timeline for Completing Cleanup Activities

Not applicable.

Coordination Between State and Federal Agencies

Not applicable.

Anticipated Funding Requirements

Not applicable.

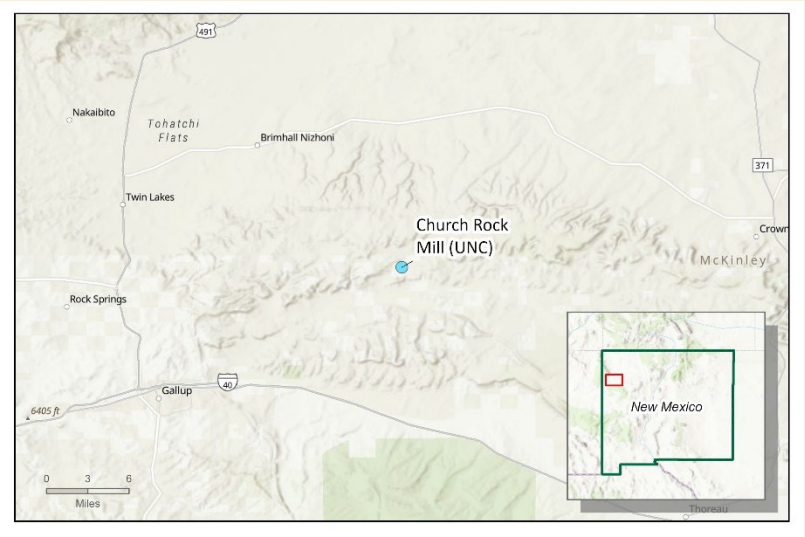
Disclaimer

This Bokum Mill site review is based on court and NRC records. As noted above, this is because the State of New Mexico transferred relevant records to the NRC and is no longer in possession of the documents. Site reviews in this report provide the reader with a general history and status of permitted mines and mills. For brevity, they may not provide all relevant details or agency actions related to each site.

Church Rock Mill Site Review

Location

The United Nuclear Corporation (UNC) Church Rock Mill site is located near Church Rock, New Mexico, surrounded by the Navajo Nation Indian Reservation and Tribal Allotment within the Pinedale Chapter. The site is located approximately 17 miles northeast of Gallup, New Mexico, in McKinley County in the Church Rock-Crownpoint mining district.



Ownership and History

UNC owned and operated the Church Rock Mill from 1977 to 1982. The facility is currently privately owned by UNC, which is a wholly owned subsidiary of General Electric.

The mill is a licensed U.S. Nuclear Regulatory Commission (NRC) facility. It is also listed on the U.S. Environmental Protection Agency's (EPA's) National Priorities List as the UNC Superfund Site, EPA ID#: NMD030443303. EPA and the NRC executed a Memorandum of Understanding for the site in August 1988. The NRC Site Source Materials License No. SUA-1475 remains in effect.

Reclamation and Regulatory Jurisdiction

The mill site included an ore processing mill and tailings disposal area (TDA). UNC placed an estimated 3.5 million tons of tailings in the tailings impoundments, which are subdivided into three covered tailings contaminant cells (South Cell, Central Cell, North Cell) and two covered soil borrow pits. In 1979, a dam holding back the tailings impoundments breached, releasing 1,100 tons of uranium tailings and 94 million gallons of radioactive water into the Puerco River drainage. Beginning in 1977, acidic tailings liquids were stored in the TDA, in accordance with the NRC license and standard mill procedures at that time. Seepage from the UNC mill tailings impoundments impacted the background water (groundwater operable unit OU-01). The background water is considered the portion of the mine discharge water that had infiltrated into the subsurface during the mining era. The background water is different from the water that seeped from the tailings impoundments.

The contaminants of concern in the groundwater operable unit (OU-01) include total dissolved solids, sulfate, chloride, thorium, radium-226 and radium-228, aluminum, and iron.[3] The EPA-selected remedy included containing and extracting contaminated groundwater, evaporating groundwater pumped from portions of impacted aquifers (Southwest Alluvium, and Zone 1 and

[3] According to the 1988 record of decision, the contaminants that would have to meet the applicable or relevant and appropriate requirements are aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, zinc, chloride, sulfate, nitrate, total dissolved solids, radium-226 and radium-228, uranium-238, thorium-230, and gross alpha particles.

Zone 3 of the upper Gallup Formation) and using monitoring and evaluation programs. UNC reclaimed the cells and pits between 1989 and 1995 as the NRC directed. UNC capped the tailings cells with interim radon barriers as directed by the NRC. Two evaporation ponds were constructed on top of the cells as part of EPA's groundwater remedy, which also includes long-term groundwater extraction and monitoring.[4] Surface reclamation of the tailings impoundments was completed according to the NRC, except for in the South Cell, which is covered by the two evaporation ponds.

Timeline for Completing Cleanup Activities

In 2018, UNC requested an amendment to their NRC license. If approved, the amendment would permit construction of a uranium mine waste repository on the licensed mill tailings disposal area to accommodate placing the mine waste from the Northeast Church Rock Mine, referred to as the surface soil operable unit (OU-02) of the UNC Mill site. UNC would remove mine waste from the Northeast Church Rock Mine site, which is located adjacent to the former mill, and transport and place the waste within the existing mill site tailings disposal area. In 2019, the NRC provided a formal acceptance letter of the amendment request. The NRC made a final licensing decision in February 2023 to permit placing the mine waste within the mill tailings disposal area. The estimated date for site closure is to be determined.

Coordination Between State and Federal Agencies

The NRC and EPA Region 6 are the primary regulatory agencies for the mill site with the State of New Mexico as EPA's support agency. Groundwater cleanup is being implemented and monitored under EPA Superfund oversight.

The Northeast Church Rock Mine Superfund Site is under EPA Region 9. Moving the mine waste (OU-02) is a joint EPA Region 6 and Region 9 joint remedial action. Regarding the February 2023 decision to move the mine waste, New Mexico had no decision-making power in the Engineering Evaluation and Cost Analysis that was released by EPA Region 9 to present various waste disposal alternatives.

Anticipated Funding Requirements

UNC is the responsible party for the site and is therefore responsible for funding remediation and cleanup activities.

Disclaimer

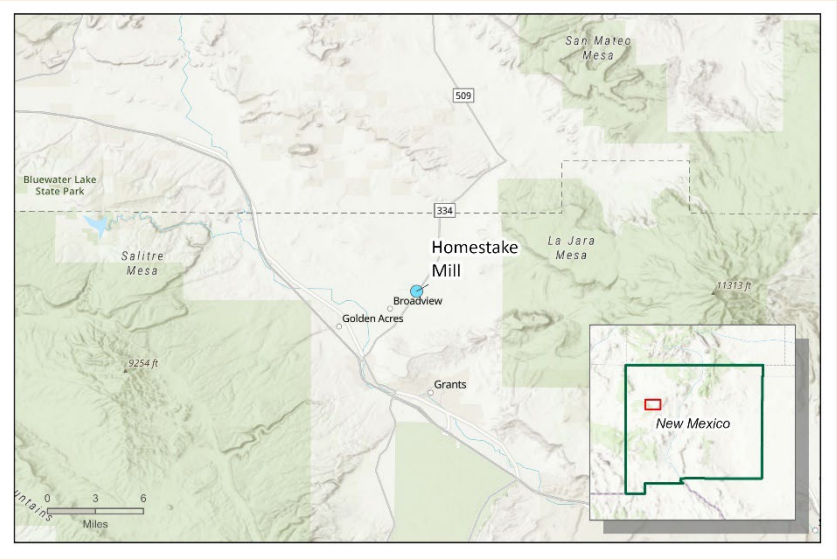
Site reviews in this report provide the reader with a general history and status of permitted mines and mills. For brevity, they may not provide all relevant details or agency actions related to each site.

[4] There is a 1988 memorandum of understanding between EPA and the NRC, which is the lead regulatory agency for the tailings disposal area reclamation and for surface area closure activities. EPA has its own site requirements for the groundwater contaminant outside of the tailings disposal area. The groundwater corrective action is under an EPA record of decision for OU-01 (i.e., groundwater). The NRC does have a groundwater license standard, but the groundwater conditions must also be met for EPA under the 1988 ROD for OU-01.

Homestake Mill Site Review

Location

The Homestake Mining Company of California Grants Reclamation Project is located in Cibola County, 5.5 miles northeast of Milan, New Mexico, and approximately 6.4 miles north of Grants, New Mexico.



Ownership and History

Homestake is owned by Barrick Gold Corporation. The Homestake Mill operated from 1958 until 1990. The site includes two tailings disposal areas, groundwater remediation systems including a reverse osmosis water treatment plant, and impacted portions of underlying and downgradient groundwater aquifers. Originally, there were two uranium mills that operated independently with separate tailings piles. In 1961, the two milling facilities were combined into one milling operation. Approximately 1.2 million tons of tailings were placed in the Small Tailings Pile and 21 million tons of tailings were placed in the Large Tailings Pile. Milling ceased in 1990 and mill decommissioning and soil reclamation activities started in 1993.

The Atomic Energy Commission issued a U.S. Nuclear Regulatory Commission (NRC) Source Materials License No. SUA-1471 to Homestake in 1957. In 1974, New Mexico became an NRC Agreement State, which granted it the authority to regulate uranium milling activities. The State of New Mexico was responsible for licensing and regulating uranium milling operations at the site from 1974 to 1986. In 1986, New Mexico relinquished authority back to the NRC, which is now the lead regulatory agency for the site. However, the site also was listed on the National Priorities List under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1983. The U.S. Environmental Protection Agency (EPA) Region 6 signed a Memorandum of Agreement with the NRC in 1993 to establish roles and responsibilities of both the NRC and EPA. EPA Region 6 is overseeing a Superfund Remedial Investigation/Feasibility Study (RI/FS) equivalency analysis to address groundwater restoration, long-term tailings stabilization, surface reclamation, and site closure, as well as addressing radon concentrations in neighboring communities. Homestake also is regulated under groundwater discharge permit 200 (DP-200) issued by the New Mexico Environment Department (NMED).

Reclamation and Regulatory Jurisdiction

Decommissioning of the Homestake Mill site began in 1993 pursuant to the NRC license. Current decommissioning activities include treatment of impacted groundwater, injection of water to control migration of impacted groundwater, sitewide groundwater monitoring, Large Tailings Pile top surface closure, and Small Tailings Pile full closure. Decommissioning and demolition of mill facilities, surface soil cleanup, and Large Tailings Pile side slope reclamation has been completed at the site.

In 2022, Homestake submitted a license amendment request to the NRC for an evapotranspiration cover design for the top surface of the Large Tailings Pile. Homestake is proposing to cover the top surface of the Large Tailings Pile with an evapotranspiration cover in lieu of the currently approved riprap design.

Homestake conducts groundwater remediation in accordance with the NRC license under a groundwater corrective action program (GCAP) that the NRC approved in 1989. In 2006, Homestake submitted an updated GCAP and a subsequent revision to the GCAP in March 2012 for NRC review and approval. A third revision to the GCAP was submitted by Homestake in December 2019 and updated in November 2020. To date, the subsequent revisions to the GCAP have not been approved by the NRC.

During the 2020 GCAP update, Homestake concluded that it is unlikely that the approved GCAP will be able to restore groundwater to the groundwater protection standards specified in the NRC license. Therefore, Homestake submitted an alternate concentration limit (ACL) application to the NRC in 2022. This application was not accepted by the NRC. The NRC required that the GCAP be revised and updated as of June 2023.

EPA is performing a back-diffusion study of groundwater contaminants. Fieldwork for Phase I was completed, and the report received in August 2024 is currently under review. Phase II field work is planned for the end of 2024 with completion in 2025. Phase III will start late 2025 and will be completed by early 2026.

Timeline for Completing Cleanup Activities

Currently to be determined according to the NRC.

Coordination Between State and Federal Agencies

New Mexico was responsible for licensing and regulating uranium milling operations at the Homestake Mill site from 1974 to 1986. The NRC has regulated the mill from 1986 to present after New Mexico relinquished its authority to the NRC.

Decommissioning and groundwater remediation efforts are occurring under the NRC license. Under the Memorandum of Understanding between the EPA and NRC, NRC is the designated lead regulatory agency for tailings disposal area reclamation and closure activities, while EPA performs a CERCLA-equivalent RI/FS process with Homestake.

NMED regulates the site pursuant to DP-200. The NRC, EPA, and NMED are working cooperatively to complete site closure and continue remediation efforts to ensure protection of human health and the environment. Once Homestake meets the decommissioning and groundwater cleanup requirements of the NRC license, the site will be transferred to the U.S. Department of Energy under the authority of the Uranium Mill Tailings Radiation Control Act of 1987 (UMTRCA) Title II, General License for long-term surveillance and maintenance. Title II of UMTRCA (regulated under Title 10 Code of Federal Regulations Part 40, Appendix A*)* authorized the regulation of commercial uranium mills operations on or after 1978. In June 2024, Homestake requested the NRC 'Conduct an Audit of the Groundwater Flow and Contaminant Transport Model' and to include DOE, NMED, and EPA in the audit process.

Anticipated Funding Requirements

Homestake Mining Company is the responsible party, therefore, responsible for funding the cleanup and long-term operations management at the site.

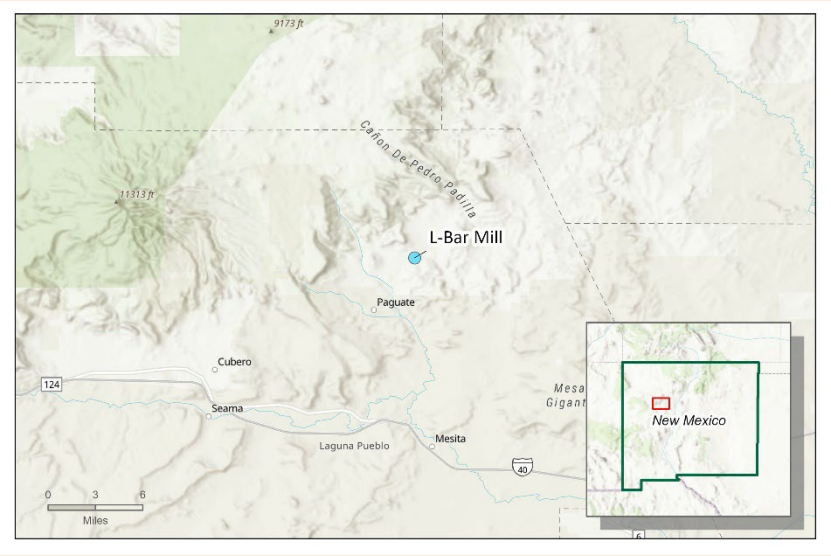
Disclaimer

Site reviews in this report provide the reader with a general history and status of permitted mines and mills. For brevity, they may not provide all relevant details or agency actions related to each site.

L-Bar Mill Site Review

Location

The L-Bar Mill is located in Cibola County, approximately 47 miles west of Albuquerque, New Mexico.



Ownership and History

The L-Bar Mill was previously owned and operated by Sohio Western Mining Company (SWMC). The site consists of a 100-acre tailings disposal cell containing around 2.1 million tons of tailings, located on a 738-acre parcel. SWMC conducted uranium mining and milling operations from 1997 to 1981 at the L-Bar Ranch site in Cibola County, New Mexico. About 2.1 million tons of ore were processed at the mill. The L-Bar mill used a sulfuric acid-leach process to extract uranium from the ore. The milling operations resulted in approximately 700,000 cubic yards of tailings, which SWMC disposed of in a 100- acre impoundment. L-Bar was transferred to the U.S. Department of Energy Office of Legacy Management (DOE-LM) in 2004 for long-term custody and remains under DOE-LM management and regulation.

Reclamation and Regulatory Jurisdiction

Milling activities produced radioactive tailings and liquid wastes, which were pumped in slurry form into an unlined, onsite tailings impoundment for disposal. During mining activities, SWMC released nickel, selenium, and uranium from the tailings facility, causing groundwater contamination. Surface reclamation and cleanup took place from 1986 to 2000. Reclamation activities included re-grading tailings, excavating diversion and drainage channels, placing radon barriers, capping tailings basins, pumping and treating groundwater, and decommissioning the mill.

SWMC demolished all aboveground structures, including the mill buildings, and completed site surface reclamation in 2000.

The site held an NMED discharge permit (DP-150) as well as a U.S. Nuclear Regulatory Commission (NRC) site-specific permit (SUA-1472), both of which have been terminated. The site currently holds an active NRC general license for the custody and long-term care—including monitoring, maintenance, and emergency measures—necessary to ensure uranium and thorium mill tailings disposal sites will protect public health, safety, and the environment after closure. Following all closure activities, SWMC acquired alternate concentration limits (ACLs) from the NRC in 1999. In January 2004, NMED notified SWMC that it terminated the DP-150 and implemented alternative abatement standards to align with the NRC ACLs. In September 2004, SWMC transferred ownership of the L-Bar site to DOE-LM, which also terminated the NRC Source Materials License SUA-1472.

The L-Bar site is under the jurisdiction of Title II of the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), which authorized the remediation of uranium mill tailings inactive prior to 1978. Title II of UMTRCA (regulated under Title 10 Code of Federal Regulations Part 40, Appendix A), specifies that once reclamation is complete, long-term custody of the site is the responsibility of the federal government or the host state. New Mexico declined to become responsible for the site, so DOE-LM became responsible.

Timeline for Completing Cleanup Activities

The New Mexico Office of Natural Resources Trustee (ONRT) worked with the Cebolleta Land Grant to implement groundwater protection restoration projects that upgrade wastewater management systems (including treatment and sewer systems) for the nearby communities of Bibo, Cebolleta (also spelled Seboyeta in published documents), and Moquino.

The NRC granted final cleanup approval in 2001, as well as approval of ACLs for uranium and selenium. The New Mexico Water Quality Control Commission approved alternative abatement standards for chloride, sulfate, nitrate, total dissolved solids, uranium, and selenium in 2003. Based on groundwater sampling trends and computer modeling, the remaining contaminated groundwater is not expected to migrate beyond the site boundary. In 2004, SWMC transferred ownership and maintenance of the site to DOE-LM.

DOE-LM manages the disposal site according to a site-specific Long-Term Surveillance Plan to ensure the disposal cells continue to protect against contaminants releasing into the environment. DOE-LM conducts annual inspections of the site to evaluate the conditions of surface features, performs site maintenance, and monitors groundwater to ensure that contaminated groundwater does not exceed concentrations approved in the ACL agreement.

In accordance with 40 Code of Federal Regulations 192.32, the disposal cells are designed to be effective for 1,000 years, to the extent reasonably achievable, and for at least 200 years in any case. The general license has no expiration date, and DOE-LM's responsibility for the site will last indefinitely.

Coordination Between State and Federal Agencies

The site is currently monitored and managed by the LM under Title II of UMTRCA. ONRT has developed and implemented the site restoration plans.

Anticipated Funding Requirements

ONRT prepared and implemented a restoration plan for the L-Bar site using funds from a settlement with SWMC for alleged damages to the natural resources of the State of New Mexico. The amount of the settlement was $35,174.77, of which SWMC paid $29,830 to ONRT to replace, restore, or acquire the equivalent groundwater natural resources. SWMC paid the difference of $5,344.77 to ONRT and the New Mexico Attorney General to reimburse these entities for costs incurred to assess the damage.

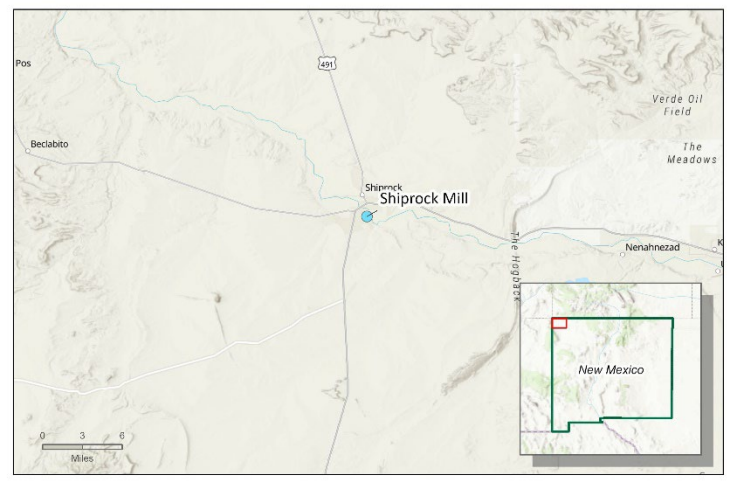
Disclaimer

Site reviews in this report provide the reader with a general history and status of permitted mines and mills. For brevity, they may not provide all relevant details or agency actions related to each site.

Shiprock (Navajo) Mill Site

Location

The former Shiprock Mill site is located within the Navajo Nation in the northwest corner of New Mexico near the town of Shiprock, approximately 28 miles west of Farmington.



Ownership and History

The Shiprock site is a former uranium and vanadium ore processing facility located on the Navajo Nation. Known as the Navajo Mill at the time, Kerr-McGee built and operated the mill site from 1954 to 1963, after which Vanadium Corporation of America purchased the mill and operated it until its closure in 1968.

In 1983, the U.S. Department of Energy (DOE) and the Navajo Nation entered into an agreement for site cleanup. The DOE obtained a U.S. Nuclear Regulatory Commission (NRC) general license in 1996 for the Title I site under the Uranium Mill Tailings Radiation Control Act of 1987 (UMTRCA). UMTRCA Title I (regulated under Title 10 Code of Federal Regulations [CRF] Part 40, Appendix A) authorized remediating inactive uranium mill tailings sites prior to the law's enactment in 1978.

By September 1986, all tailings and associated materials (including contaminated materials from offsite vicinity properties) were encapsulated in an NRC-approved disposal cell, which was built on top of the existing tailings piles.

The disposal cell and former mill site are located on a geological terrace (both natural and engineered) through which two minor drainages flow. The terrace groundwater system is assumed to be associated with past milling operations and irrigation. At the northeast edge of the terrace, a northwest-trending escarpment about 55 feet high forms the boundary between the terrace area and the San Juan River floodplain to the north, associated with a near-surface alluvial aquifer at the base of the escarpment. In 1961, Kerr-McGee drilled a test hole to a depth of 1,850 feet that resulted in artesian flow into the Bob Lee Wash that transects the northern area of the site. Discharge of almost 65 gallons per minute from the well continues today and supplies more than half the volume of groundwater in the floodplain. The floodplain aquifer also receives contributions from the San Juan River and the terrace groundwater system.

Currently, the water of the terrace groundwater system is approximately 24 feet below ground surface near the disposal cell and evaporation pond, but its depth varies widely across the site and changes with seasonality. The depth to groundwater in the floodplain area below is approximately 7 to 9 feet below ground surface. According to the DOE Office of Legacy Management (DOE-LM), past milling operations have left contaminants in both the terrace groundwater system and the floodplain alluvial aquifer. The DOE-LM reports that contaminated groundwater has reached the upper few feet of the underlying shale bedrock and contaminated the alluvial aquifer on the floodplain. The contaminants of concern are ammonia, manganese, nitrate, selenium, strontium, sulfate, and uranium.

Reclamation and Regulatory Jurisdiction

The State of New Mexico has no jurisdiction or regulatory role pertaining to the Shiprock mill and disposal site.

In 2002, DOE presented a draft groundwater compliance action plan, which presented a basis for selecting the compliance strategies outlined below. In 2005, DOE revised the conceptual model of the site to assess the groundwater treatment system design and provided recommendations on ways to improve the system. DOE currently implements three different compliance strategies at the site:

1. **Active remediation in the eastern portion of the terrace.** Milling-related water from the groundwater system is pumped from extraction wells and collected in interceptor drains along Many Devils Wash and Bob Lee Wash. Removing this water through the well system and interceptor drains will dry the seeps and reduce the amount of groundwater reaching the surface. Extracted water is piped to an 11-acre evaporation pond on the south side of the disposal cell.
2. **Supplemental standards with monitoring in the western portion of the natural and engineered terrace.** In the western portion of the terrace, groundwater is considered a limited-use resource (i.e., is not a current or potential source of drinking water) because it meets specific and defined criteria. In this area, it is considered limited use due to ambient contamination not related to milling activities that cannot be cleaned up using treatment methods reasonably employed in public water systems (40 CFR 192.11[e][2]). Some contaminants—selenium, sulfate, and uranium—may be naturally occurring due to the nearby Mancos Shale geological formation, and standards may never be achieved for this region.
3. **Natural flushing in conjunction with active remediation for the floodplain.** The floodplain aquifer is undergoing active remediation involving the extraction of contaminated groundwater in conjunction with natural flushing, alternate concentration limits for selenium and sulfate, and continual monitoring. Alternate concentration limits may be adopted within specified areas if established maximum concentration limits are unattainable. Groundwater that infiltrates the floodplain from the eastern terrace system collects in interceptor trenches and wells located at the base of the escarpment. Around one million gallons of water is extracted from the floodplain contaminant plume each month and is piped to the evaporation pond on the terrace.

DOE chose the different compliance strategies based on the amounts of contamination in each area, and a different balance of groundwater recharge. Groundwater monitoring and surface water monitoring are occurring at all three areas. The NRC reviews all DOE-LM plans and actions.

In addition to the three compliance strategies listed above, institutional controls on the floodplain are in place to minimize the potential risk to human health and the environment, including (1) grazing restrictions, (2) control of access to the floodplain area, (3) a DOE–Navajo Nation agreement prohibiting groundwater use in the floodplain, and (4) assurance from the Navajo Nation Water Code Administration that the flowing artesian well can continue to flow into Bob Lee Wash and onto the floodplain.

Timeline for Completing Cleanup Activities

The DOE-LM conducts annual inspections of the site, performs site maintenance as necessary, and monitors groundwater in perpetuity to ensure the continued integrity of the disposal cell.

In accordance with the standards outlined by EPA in Title 40 CFR Part 192.02(a), the disposal cell is designed to be effective for 1,000 years, to the extent reasonably achievable, and for at least 200 years in any case. The general license has no expiration date, and DOE-LM's responsibility for the disposal cell will last indefinitely.

Because the site is located on the Navajo Nation, the State of New Mexico cannot weigh in on a completion timeline or progression of cleanup.

Coordination Between State and Federal Agencies

The site is under long-term stewardship by DOE-LM on the Navajo Nation and regulated by the NRC. There is no coordination with the State of New Mexico.

Anticipated Funding Requirements

While there is no available site-specific funding requirement for the Shiprock site, DOE-LM periodically provides a rounded 75-Year Constant Dollar Total cost for all UMTRCA Title I Sites to the U.S. Congress. As of 2022, the combined total of $709,073,000 was estimated for all Title I sites.

Disclaimer

Site reviews in this report provide the reader with a general history and status of permitted mines and mills. For brevity, they may not provide all relevant details or agency actions related to each site. All information regarding the Shiprock site is sourced from information publicly available on the DOE-LM website.

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Appendix C. NMED's 2023 "Abandoned Uranium Mines Data Gaps Analysis" Report

REPORT

Abandoned Uranium Mines Data Gap Analysis

NMED
New Mexico Environment Department

2023

NEW MEXICO
ENVIRONMENT DEPARTMENT

Abandoned Uranium Mines Data Gap Analysis

Office of Strategic Initiatives
1190 St. Francis Drive, Suite N4050
Santa Fe, New Mexico 87505
505.827.2855

www.env.nm.gov

Our Mission

To protect and restore the environment and to foster a healthy and prosperous New Mexico for present and future generations.

Table of Contents

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List of Acronyms

AML	Abandoned Mine Lands
AMRP	Abandoned Mine Reclamation Program
ASMI	Arizona State Mine Inspector
AUM	Abandoned Uranium Mine
AUMWG	Abandoned Uranium Mines Working Group
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CAF	Corrective Action Fund
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DFD	Denver Field Division of OSMRE
DOE	United States Department of Energy
DOE-LM	Office of Legacy Management within the Department of Energy
DOGM	Division of Oil, Gas, and Mining
DOI	Department of the Interior, United States
DRUM	Defense-Related Uranium Mine Program
EMNRD	New Mexico Energy, Minerals and Natural Resources Department
EY	Evaluation Year
ft	foot or feet
FTE	full-time equivalent
GWQB	Ground Water Quality Bureau
HB164	New Mexico House Bill 164
HWB	Hazardous Waste Bureau
IMRP	Inactive Mine Remediation Program
MARP	Mining Act Reclamation Program
Mining Act	1993 New Mexico Mining Act (Mining Act; Chapter 69, Article 36 New Mexico Statutes Annotated [NMSA] 1978
MMD	Mining and Minerals Division
MOU	Memorandum of Understanding
NAAMLP	National Association of Abandoned Mine Land Programs
NAMLRD	Navajo Abandoned Mine Lands Reclamation Department
Navarro	Navarro Research and Engineering Inc
NEPA	National Environmental Policy Act
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated

NMWQCC	Water Quality Control Commission
NNEPA	Navajo Nation Environmental Protection Agency
NNSP	Navajo Nation Superfund Program
NPL	National Priority List
NRC	Nuclear Regulatory Commission
OSMRE	Office of Surface Mining Reclamation and Enforcement
PSTB	Petroleum Storage Tank Bureau
RCRA	Resource Conservation and Recovery Act
ROS	Remediation Oversight Section
RP	Responsible Party
RRC	Railroad Commission of Texas
SMCRA	Surface Mining Control and Reclamation Act
SOS	Superfund Oversight Section
SWQB	Surface Water Quality Bureau
TBA	Targeted Brownfields Assessment(s)
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material
TMDL	Total Maximum Daily Load
TNRC	Texas Natural Resources Code
Tronox	Tronox Incorporated
UAC	Utah Administrative Code
UMC	Uranium Mine Cleanup
UMRRF	Uranium Mining Reclamation Revolving Fund
UMTRA	Uranium Mill Tailings Remedial Action
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
V&V	Verification and Validation
VRP	Voluntary Remediation Program
WQA	New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17
WYAMLD	Wyoming Abandoned Mine Lands Division
WYAMLP	Wyoming Abandoned Mine Land Program

Executive Summary

Throughout New Mexico, there are abandoned uranium mine (AUM) sites where mine features exist that have not been cleaned up and may threaten the health and safety of New Mexicans and the environment. The release of contaminants from AUM features to soil or groundwater may have occurred decades ago and responsible parties (RPs) may be long-gone, but the contamination and safety issues persist. Because most AUM sites in New Mexico rarely rank high enough to be considered for United States Environmental Protection Agency (USEPA) Superfund National Priorities List or other national programs, federal funds are lacking. Furthermore, little state funding is available to ensure that neglected AUM mine sites are appropriately evaluated and cleaned up. The lack of progress in addressing these AUM sites is taking on increasing significance for the state due to renewed interest in uranium as a resource for alternative energy, national defense, and increasing environmental concern.

Neglected AUM sites, a subset of AUMs, are former uranium mine sites that do not have an identifiable responsible party (RP) and do not fall under an existing state, tribal, or federal program. The existing federal and state regulatory framework for addressing cleanup of AUM sites is complex and includes many different federal agencies and programs as well as state agencies and programs. However, neglected AUM sites may not be able to be fully assessed and cleaned up by these existing agencies and programs due to the requirements of the funding mechanisms and the requirements of the programs themselves.

In February 2022, the New Mexico Legislature passed House Bill 164 (HB164), which directs New Mexico Environment Department (NMED) to coordinate uranium mine cleanup in New Mexico. HB164 also required NMED to develop a Uranium Mine Reclamation Coordinator position, tasked with leading the charge for AUM cleanup.

One of the first directives of the Uranium Coordinator was to develop this report to provide:

- an overview of AUMs,
- outline the regulatory complexity of AUM cleanup,
- identify funding mechanisms for cleanup of AUM sites,
- provide a few examples of AUM sites in New Mexico,
- review and summarize AUM programs in other states,
- propose a path for an AUM cleanup program, and
- a discussion of the barriers and benefits of addressing AUM sites in New Mexico.

AUM sites present hazards to humans and the environment and may not have a clear pathway to cleanup.

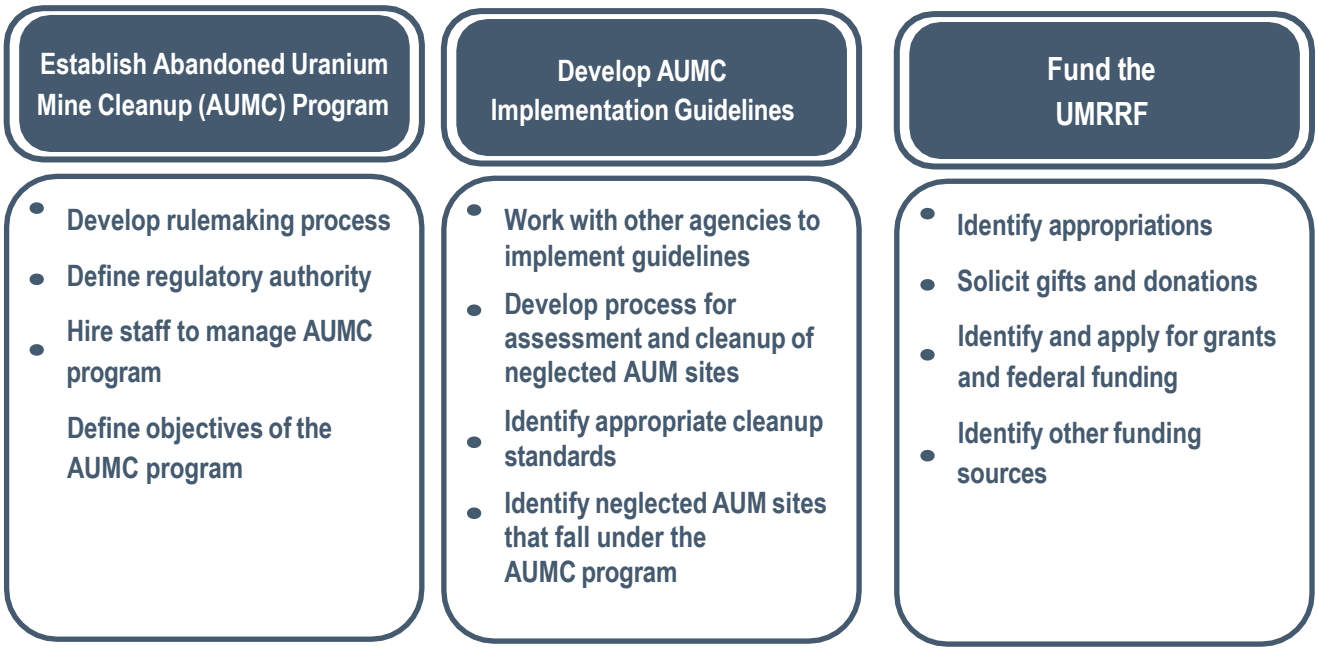
This report provides examples of neglected AUM sites that have undergone partial assessment and cleanup under existing programs, however most of these sites have only had surface reclamation conducted through an existing state or federal program. Additional characterization and cleanup may be needed for these example AUM sites. Likewise, many AUM programs in other states also focus primarily on surface reclamation and have similar funding shortfalls that do not allow for a full assessment and cleanup of their neglected AUM sites.

The data gaps, or barriers, that exist for addressing neglected AUM sites in New Mexico include the following:

1. The need for a complete inventory and review of AUMs so that NMED can identify the neglected AUM sites that need assessment and cleanup.
2. The need for comprehensive site assessments to fully characterize the extent of cleanup and funding required to address neglected AUM sites.
3. The need for definition of the regulatory framework for addressing both surface reclamation and groundwater remediation for neglected AUM sites.
4. The lack of an AUM regulatory program, and staff, to administer rules and guidelines associated with the assessment and cleanup of neglected AUM sites. Current state regulations address requirements for groundwater remediation and surface reclamation, but only when an RP is identified. There is a gap in bringing neglected AUMs with no RP under the state's existing regulatory framework.
5. The lack of funds available in the Uranium Mine Reclamation Revolving Fund (UMRRF) for cleanup activities.

However, this report also proposes the actions for removing the barriers and closing the data gaps so that cleanup of neglected AUM sites in New Mexico is possible. The initial recommended steps include establishing an Abandoned Uranium Mine Cleanup (AUMC) Program, developing AUMC implementation guidelines, and funding the UMRRF. These key actions will allow NMED to meet the objectives of HB164 to advance uranium mine reclamation as a whole, which thereby includes neglected AUM sites that do not fall under an existing program.

Uranium mines in New Mexico supported the national defense efforts of the Atomic Age and now the state is left with the legacy of those AUM sites. The State of New Mexico has taken the first step to addressing neglected AUM sites through the passage of HB164 and establishment of the UMRRF. The crucial next steps can now be taken to fully characterize and clean up all neglected AUM sites (not already covered under an existing state, tribal, or federal program) to protect both New Mexicans and the environment.



1 - Introduction

New Mexico's enchanting landscapes, from its mountain sky islands to gypsum dune fields, overlie immense mineral deposits. Geological events over millions of years enriched the state with base and precious metals, aggregates, coal, oil, and natural gas. Mining has been a part of the state's history since precolonial times. As a result, approximately 15,000 abandoned mines and mine features have been recorded in the state (ENMRD, 2022), many of which may pose a risk to human and environmental health.

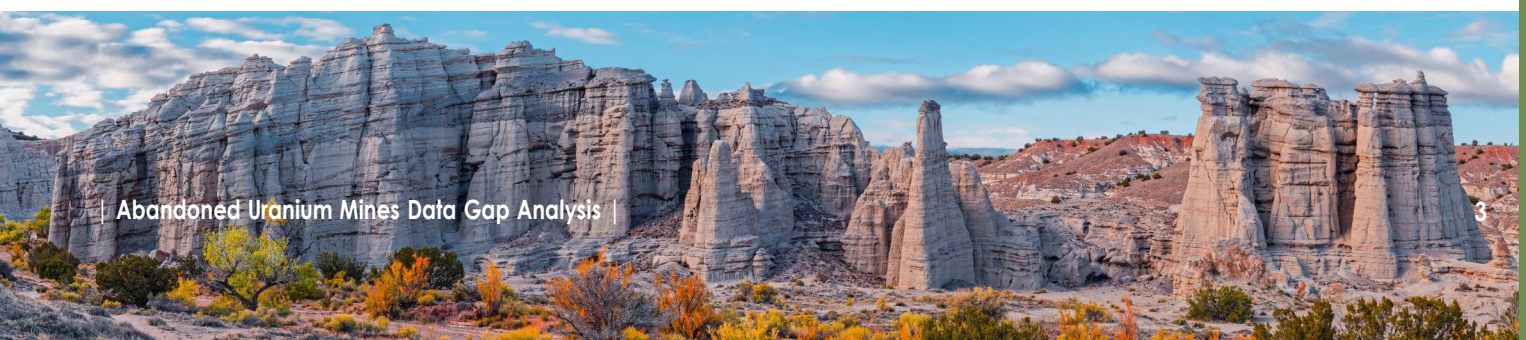
The inception of the state's uranium industry was driven by the Atomic Age. New Mexico's vast uranium deposits were delineated and exploited in support of two preoccupying national interests: defense and nuclear power. Uranium's radioactive properties make it an extremely valuable source of concentrated energy. The resulting 1950s uranium boom occurred prior to the establishment of state and federal legislation to protect the environment and water resources. State and federal legislation to protect the environment was not enacted until the mid-1970s, and by then federal interest in uranium had stagnated, leaving many mines abandoned, un-reclaimed, and un-remediated.

The New Mexico Energy, Minerals and Natural Resources Department (EMNRD) Mining and Minerals Division (MMD) has compiled a list of approximately 260 abandoned uranium mine (AUM) sites across New Mexico on land owned by private individuals or managed by different state or federal agencies. At least half of the AUM sites have had no cleanup or have an unknown status, with many more that have only partial or in-progress cleanup status.

New Mexico's precious environmental and ecological resources can only be preserved through intentional and focused efforts that include addressing past impacts from mining.

Often, the responsible party (RP) no longer exists or cannot be identified. As a result, many potentially hazardous AUMs remain a threat to humans and the environment. There have been several efforts by state and federal entities to identify and address the numerous data gaps associated with AUMs across the country. This report details New Mexico's latest efforts in this regard.

In 2022, House Bill 164 (HB164) was passed. HB164 directed New Mexico Environment Department (NMED) to coordinate AUM cleanup across 11 state agencies (including NMED), develop a strategic plan, update the AUM database, and develop a uranium mine cleanup workforce within the State. NMED, in collaboration with MMD, is working to compile, review, and update the available information on AUMs across the State.



NMED has produced this report to explain the following:

- The definition and location of AUM sites in New Mexico.
- The state and federal regulatory frameworks for cleaning up AUM sites.
- Existing funding programs and how AUM sites may or may not be addressed.
- The hazards that AUM sites pose to New Mexicans' health and the environment and the benefits that would accrue from their cleanup.
- Some examples of AUM cleanup in New Mexico.
- A brief explanation of how AUM sites are being addressed in other states.
- An overview of a proposed uranium mine cleanup program for AUM sites.

From top left: Photos 1 and 2 show abandoned mine equipment at a neglected AUM site in New Mexico.

Bottom left: Shaft at a neglected AUM site in Hidalgo County.

Bottom right: Mine equipment at a neglected AUM site in New Mexico.

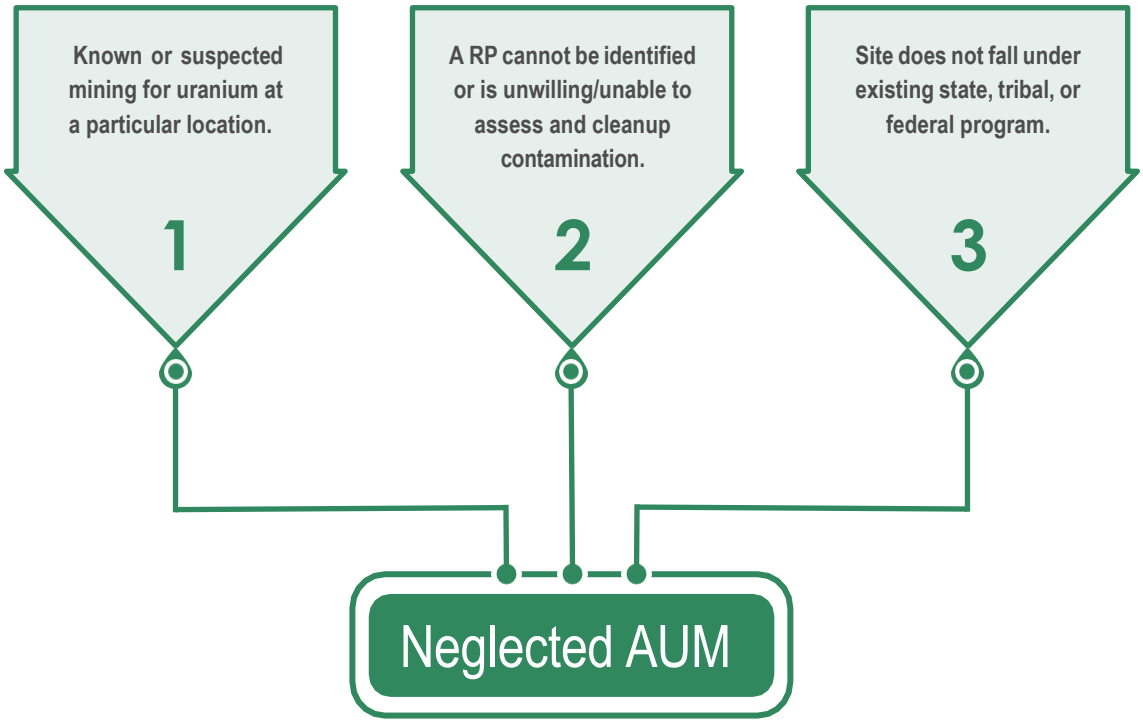
2 - Overview of Abandoned Uranium Mines

AUMs are known or suspected former uranium mining sites. Neglected AUMs are a subset of AUM sites that do not fall into an existing program and need to be addressed as directed by HB164. As illustrated in Figure 1, neglected AUMs are former uranium mine sites that have no identifiable RP to address site cleanup and are not eligible for other programs.

Neglected AUMs excludes AUM sites located on tribal lands or lands managed by federal agencies, such as the United States Forest Service (USFS) or the Bureau of Land Management (BLM). AUM sites on tribal and federal lands are being addressed through existing tribal and federal agencies and programs.

A large sink hole at a neglected AUM site in New Mexico. Neglected AUM sites may pose a physical danger to New Mexicans from pits, shafts (vertical entrances), adits (horizontal entrances), exposed waste rock, and other unstable mine structures.

Figure 1 Criteria for Defining Neglected AUM Sites in New Mexico (excludes AUMs located on tribal and federal lands)



The lack of action by an RP may include the following:

1) the RP has not or cannot be identified or located,
2) the RP does not acknowledge responsibility, or
3) the RP is unable or unwilling to proceed with assessment and cleanup.

Some AUM sites have known or suspected contamination that may pose a threat to human health or the environment, and many are not eligible for comprehensive cleanup assistance through an existing state or federal program. As described in the next section, some safeguarding of sites without a viable RP can be addressed through existing programs; however, the cleanup of contaminated soil or water at AUM sites is not currently addressed through already existing regulatory programs. Consequently, some AUM sites across the state languish as ongoing sources of land and water contamination.

2.1 Where are AUMs located?

Based on currently available information, MMD and NMED have compiled a list of approximately 260 known or suspected former uranium mine sites across New Mexico with mine features that have not been reclaimed. These identified AUM sites are shown on the map included as Figure 2. Many AUM sites are in rural areas, but in some cases AUM sites are also located near human populations or sensitive habitats. Many of the rural AUM sites are on public lands, which presents increased risks as more outdoor enthusiasts such as hikers, campers, hunters, and off-road drivers access public lands and as urban areas expand into more isolated areas. Documentation of the type of contamination and infrastructure present exists for some AUM sites, but for others very little is known. In addition, AUM sites continue to be discovered. NMED and MMD are updating the legacy uranium mines database and dashboard, an online interactive inventory (MMD, 2010).

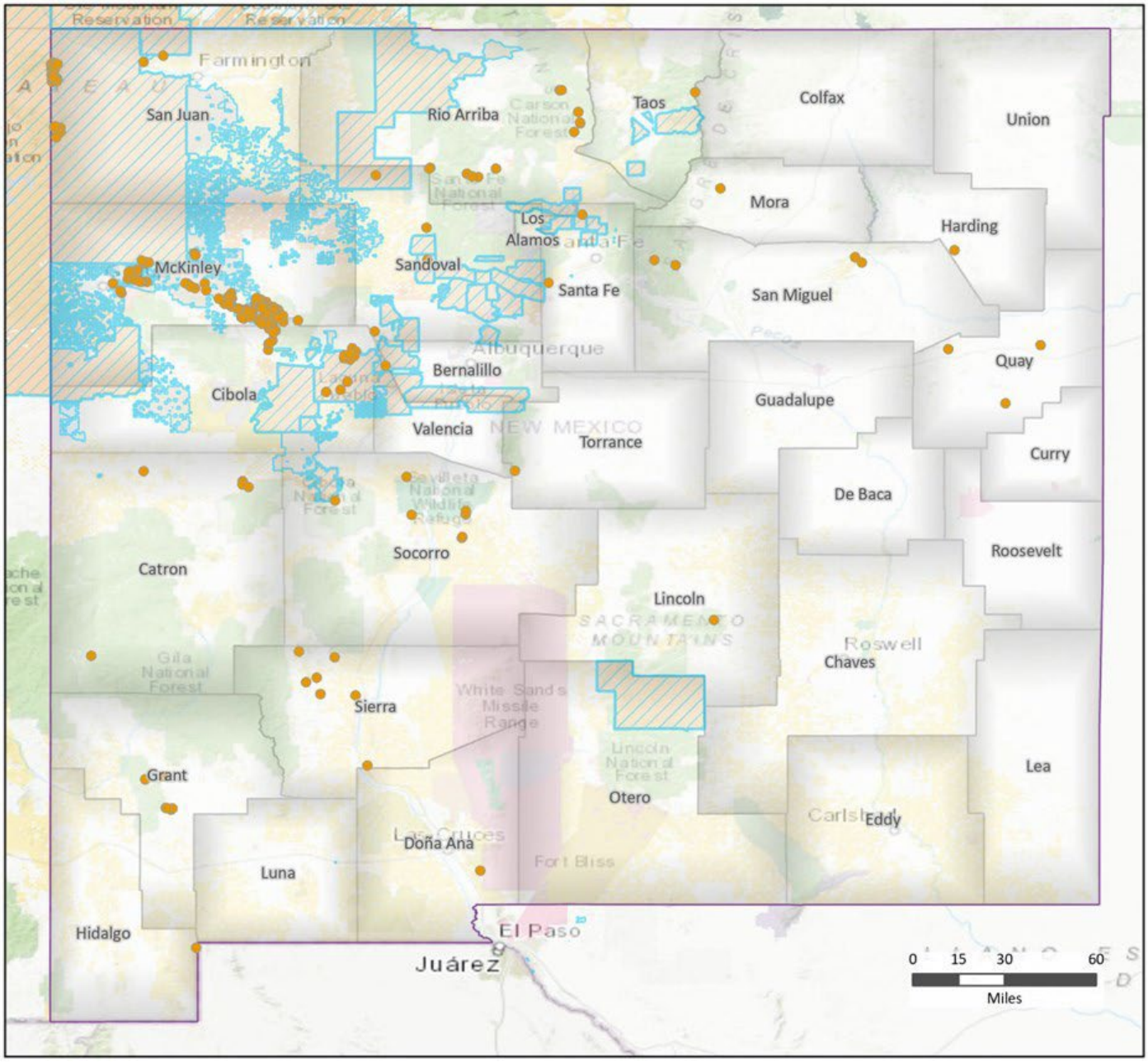
2.2 What types of hazards may be present at an AUM site?

AUMs pose a risk to human health and the environment through a combination of physical dangers, radiological hazards, and threats from heavy metal contaminants. Physical dangers include pits, shafts (vertical entrances), adits (horizontal entrances), exposed waste rock, and other unstable mine structures. Soils and groundwater near an AUM may be contaminated by radiological and metal contamination including uranium, radon, arsenic, selenium, or other metals that can be toxic to humans or wildlife if they are inhaled or ingested.

If you think you might have an AUM on your land, please report it to NMED through their online webform:

https://www.env.nm.gov/general/report-an-environmental-issue-or-incident/

Figure 2. Map of Identified AUM Sites in New Mexico



Abandoned Uranium Mines

Tribal Lands - Indian Country
- Reservation
- Trust

- County Boundaries
- Department Of Defense (DOD)
- Bureau of Land Management (BLM)
- National Park Service (NPS)
- US Forest Service (USFS)
- US Fish and Wildlife (USFW)
- Bureau of Reclamation (USBR)
- Bureau of Indian Affairs (BIA)
- Other Federal
- State
- Local
- Private or Unknown

2010 New Mexico Legacy Uranium Mines Dashboard Data

Mine Location information from Energy, Minerals, and Natural Resources Department - Mining & Minerals Division, compiled 2006- 2010

Data Sources: BLM Energy, Minerals & Realty Management, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPSNMED, EMNRD,BLM Coordinate System: NAD 1983

This map data may contain technical inaccuracies or typographical errors. Data is updated when corrections are submitted to data stewards. It is the responsibility of mine operators to register any mine or mill feature with MRRS prior to the start of operations; to notify MRRS of operational changes; and to accurately and periodically report data as required under the statute and attendant regulation.

NMED New Mexico Environment Department

NMED Office of Strategic Initiatives

2.3 What types of risks are associated with AUMs?

Safety risks. AUM sites often pose safety risks such as abandoned structures, deteriorated equipment, open foundations, shafts, trenches, adits extending into a rock face, drums, and open pits. The abandoned mine features can be very unstable or deep and may cause injury or death if humans or animals stray into them.

Environmental risks. Contaminants released into the environment may find their way into soil, waterways, groundwater, and the air. Contamination in one of these media can move into other media, e.g., from the soil into groundwater or air. The risk of groundwater contamination is of particular concern in our arid state, as groundwater is the only drinking water source in many areas. Soils damaged by groundwater contamination may be unable to support vegetation or crops. Wildlife may be exposed to toxins, and over time, pollutants may bioaccumulate in the food chain. Loss of habitat can lead to decreased biodiversity. The capacity of the land to absorb stormwater may also be diminished due to erosion or lack of vegetation, thereby increasing flood risk.

Human health risks. The three basic pathways for becoming exposed to contamination are (1) breathing, (2) eating and drinking, and (3) direct contact with the skin. Where the contamination is in the environment and what exposure pathways exist are important considerations when evaluating the health risks at a particular site. If the groundwater is contaminated, exposure can occur by drinking water from an impacted well. Contaminated soil can result in windblown soils and dust with elevated metals and radiological material that may spread off-site, which could be inhaled or may contaminate surface water.

Where a site has not been fully assessed, as is the case for many AUMs, the extent and severity of contamination is unknown and could be affecting an area larger than the site itself. Also, nearby New Mexicans may not even know they are being exposed. Sensitive populations, such as children, pregnant women, and the elderly, may be at higher risk. Inhalation and ingestion of these metals and radiological material may cause chronic illnesses.

2.4 What is a potential process for NMED to address Neglected AUM sites?

Under direction from HB164, NMED is directed to coordinate across regulatory programs to assess the available information—and in some cases conduct a site visit—to determine the best way to obtain additional data about a site. If

1) the site does not fall under an existing regulatory program,
2) an RP cannot be found to clean up the site, and
3) the site presents a potential hazard, NMED will investigate the neglected AUM site (Figure 3).

If a private well or adjacent land is known to be impacted by a neglected AUM site, NMED should notify the affected parties so they can take necessary actions to protect themselves. NMED should work with local jurisdictions and the appropriate agencies to assess the safety, environmental, and health risks associated with a site and encourage mitigation of physical hazards if present and determine a path for cleanup. Figure 3 shows the complexity for addressing AUM sites in New Mexico (excluding sites on tribal land and federal land). If an RP is not identified and an AUM site does not fall under an existing cleanup program, NMED will need to investigate and rank the neglected AUM site. A proposed approach is discussed in more detail in Section 7.

AUM sites presenting the greatest risks may receive evaluation by the United States Environmental Protection Agency (USEPA) Superfund program. As discussed in Section 3, most AUM sites will not qualify for the Superfund program or other existing programs, such as the Brownfields grants or NMED's Voluntary Remediation Program (VRP), but they may qualify for the USEPA's critical or non-time critical removal action.

Unless an AUM site qualifies for funding through an existing program (as described in Section 3 Regulatory Framework) or a potential RP is identified and is able to cleanup a site, NMED will have to conduct and fund a comprehensive site assessment and cleanup through the newly formed Uranium Mining Reclamation Revolving Fund (UMRRF) established by HB164. In order to conduct comprehensive site assessments and cleanup, NMED would benefit from the development of an Abandoned Uranium Mine Cleanup (AUMC) Program, as discussed in Section 7.

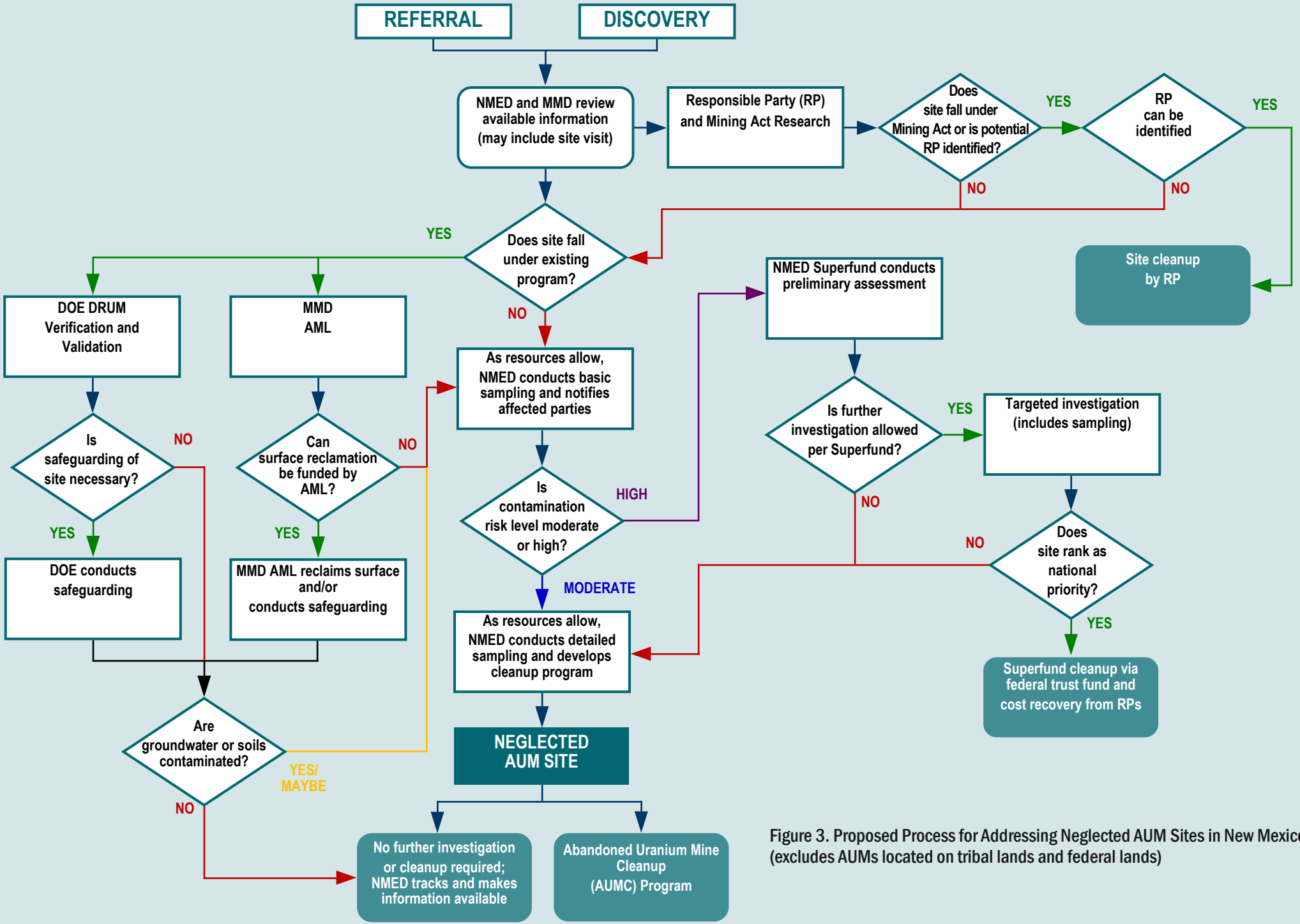


Figure 3. Proposed Process for Addressing Neglected AUM Sites in New Mexico (excludes AUMs located on tribal lands and federal lands)

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3 - Regulatory Framework for Cleaning Up Contaminated AUM Sites

The state is charged with the protection of its people and environment while also encouraging sustainable mining development. Mining in New Mexico is regulated by the 1993 New Mexico Mining Act (Mining Act; Chapter 69, Article 36 New Mexico Statutes Annotated [NMSA] 1978), which promotes the responsible use and surface reclamation of lands impacted by exploration, mining, or mineral extraction. The Mining Act requires operators to obtain permits, meet operation and reclamation standards, and create and follow an approved reclamation plan with financial assurance (i.e., bonds) for future reclamation.

The Mining Act applies to mines operating at the time the act was passed, new mines that began operating after the act's effective date, and all future mines. The Mining Act also covers any mining operation that had ceased operations prior to the act being passed and had produced marketable minerals for at least two years between January 1, 1970, and the effective date of the New Mexico Mining Act. The Mining Commission was established to develop the rules needed to implement the Mining Act and to hear appeals regarding permitting and enforcement actions by MMD.

Although the New Mexico Mining Act applies to all mines operating in New Mexico now and some abandoned mines as well, many AUM sites predate the modern Mining Act and may not have an identified RP to implement surface reclamation or groundwater remediation. The regulatory framework for addressing contaminated AUM sites is complex and may include a combination of state and federal agencies to achieve cleanup. The state and federal laws, agencies, and regulatory programs that may address or be relevant to AUM cleanup, or a portion of cleanup, are described in the sections below.

Many neglected AUM sites contain hazards and there is very little funding to cleanup the sites under existing federal and state programs.

3.1 State Regulatory Framework

3.1.1 New Mexico House Bill 164 'Uranium Mine Cleanup

On March 1, 2022, New Mexico passed HB164 in an effort to address the legacy of uranium mining in the state. HB164 directed NMED to coordinate the cleanup of former uranium mine and mill sites in New Mexico with 10 other relevant federal and state agencies. It further directs the NMED to develop a strategic plan for the cleanup of abandoned uranium mines and mills, and in doing so to also develop a process for effective consultation and coordination with tribal nations and the federal government. HB164 also directs that uranium mine and mill cleanup should be established as an economic development industry in the state. HB164 established the UMRRF to fund neglected AUM site assessment and cleanup. The UMRRF is discussed in more detail in Section 4. The intent of HB164 was to take a new approach to AUM cleanup that was inclusive of regulatory action, workforce development, funding, and communication and coordination with numerous stakeholders. Within that framework, regulatory action for permitted sites and sites with a RP is already in place. However, there is no framework for addressing comprehensive AUM cleanup for neglected AUM sites.

3.1.2 New Mexico Energy Mineral and Natural Resource Department: Mining Act Reclamation Program and Abandoned Mine Land Program

The Mining Act Reclamation Program (MARP) within EMNRD MMD was created under the New Mexico Mining Act. This program regulates specific hard rock mining surface reclamation activities to ensure proper surface reclamation is completed in accordance with the provisions and standards outlined in the Mining Act (19.10 New Mexico Administrative Code [NMAC]). The EMNRD MMD also manages the Abandoned Mine Land (AML) Program, which was formed on May 2, 1977, by the passage of the Surface Mining Control and Reclamation Act (SMCRA). The AML program is part of the National Association of Abandoned Mine Land Programs (NAAMLP). NAAMLP, made up of 23 states and three tribes, seeks to accomplish common goals and objectives related to the surface reclamation of AMLs (NAAMLP, 2023).

Due to funding requirements, discussed below in Section 4, the AML program is focused on coal mine surface reclamation and must get authorization to address non-coal abandoned mines if surface reclamation is necessary to protect the public and/or the environment from extremely dangerous sites. Once a mine is deemed high priority by the MMD AML Program per SMCRA requirements (i.e., dangerous or environmentally hazardous), MMD AML must go through National Environmental Policy Act (NEPA) processes before surface reclamation can commence (EMNRD, 2022). The MMD AML Program has completed 220 projects and safeguarded more than 2,400 mines (WYDEQ, 2023). However, there are over 15,000 abandoned mines and mine features in the state of New Mexico, and the stated purpose of SMCRA is surface reclamation for coal mines. Unless there is a decision to prioritize AUMs in the context of the MMD AML Program, the timeline for classification and cleanup of AUMs via this framework is uncertain. Furthermore, the AML Program does not assess or address groundwater impacts. It is used primarily for safeguarding sites.

3.1.3 New Mexico Water Quality Act

The New Mexico Water Quality Act (WQA; Sections 74-6-1 through 74-6-17 NMSA 1978) and the New Mexico Water Quality Control Commission (NMWQCC) Ground and Surface Water Protection Regulations (20.6.2 NMAC) address protection of both surface and groundwater through groundwater discharge permits and groundwater abatement. The NMWQCC Regulations address discharges that may move directly or indirectly into groundwater that have the potential to cause an exceedance of 20.6.2.3103 NMAC water quality standards. Activities that have the potential to discharge to groundwater and/or surface water are addressed through a discharge permit. The NMWQCC Regulations also contain provisions requiring the abatement of identified contamination to remediate or protect surface and groundwater so that NMWQCC water quality standards are attained. Parties responsible for causing contamination are required to assess and clean up the contamination in accordance with these regulations, regardless of the contaminant type, unless other regulations apply. A viable RP must be identified (or appointed) for cleanup to occur under the abatement section of the regulations. The neglected AUM sites do not have viable or willing RPs.

3.1.4 NMED Ground Water Quality Bureau

The NMED Ground Water Quality Bureau (GWQB) administers multiple sections that address permitting and abatement under the WQA and the NMWQCC Regulations including the: Agricultural Compliance Section, Remediation Oversight Section (ROS), Pollution Prevention Section, Mining Environmental Compliance section (MECS), and Superfund Oversight Section (SOS). This report only addresses ROS, SOS, and MECS programs.

Remediation Oversight Section

The ROS encourages and oversees voluntary efforts to clean up contaminated sites and administers the Ground and Surface Water Protection Regulations that require responsible parties to clean up contaminated soil and groundwater. This is done through the State Cleanup Program, Brownfields Program, and VRP.

State Cleanup Program: New Mexico's State Cleanup Program is responsible for administering parts of the New Mexico Ground and Surface Water Protection Regulations (20.6.2 NMAC) that pertain to the cleanup of contaminated soil, soil vapor, and groundwater. These regulations require corrective actions to mitigate groundwater contamination caused by unauthorized discharges/spills. The State Cleanup Program also oversees the investigation and abatement of subsurface contamination to meet groundwater standards by identifying and notifying responsible parties of abatement plan requirements, reviewing abatement plan proposals and reports, and making recommendations regarding NMED approval of abatement decisions. The State Cleanup Program addresses recent spills, as well as past unauthorized discharges that are discovered after the fact when there is a willing RP.

Brownfields Program: Brownfields are properties where redevelopment is complicated by the presence, or potential presence, of hazardous substances. The 2002 Small Business Liability Relief and Brownfields Revitalization Act amended Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to assess and clean up brownfields, clarified CERCLA liability protections, and enhanced funding to help states and tribes encourage brownfields redevelopment.

NMED has obtained federal grants from USEPA Region 6 to provide Targeted Brownfields Assessments (TBAs) for local and tribal governments. Depending on the specific need, a TBA is an initial or more detailed investigation of the type and extent of contamination and may be used to evaluate cleanup options and associated costs. TBA assistance is generally limited to governmental, tribal, or nonprofit entities that can demonstrate they do not have CERCLA liability, with limited funds available to private parties. For qualified sites with a willing RP, NMED offers low-interest cleanup loans through its Brownfields Revolving Loan Fund. The Brownfields Revolving Loan Fund is discussed below in Section 4. In all cases, a willing participant must come forward to seek brownfields assistance for remediation efforts. In addition, most AUM sites are in rural areas that may not be desirable locations for redevelopment.

Voluntary Remediation Program: The New Mexico VRP offers incentives for the voluntary investigation and remediation of contaminated properties by an RP. Participants in the VRP who did not contribute to the contamination at a site receive liability protection, as do lenders and future purchasers. The VRP provides regulatory oversight and closure documentation (20.6.3 NMAC). The program does not have a fund for financing cleanups with no RP.

Superfund Oversight Section

Through cooperative agreements to SOS, the USEPA provides funding for states to complete work under the Superfund (CERCLA) program. The SOS within NMED partners with the USEPA and works to identify and assess potentially hazardous inactive or abandoned sites that may require remedial or removal action under the Superfund (CERCLA) program. The SOS also provides management assistance and remediation oversight at New Mexico Superfund sites that are already on the NPL. Regulatory staff within the SOS work closely with EPA Region 6 personnel in Dallas, Texas, to complete these tasks.

In New Mexico, there are currently 14 listed Superfund sites, which are in various stages of investigation and remediation, and five sites that have been removed from the NPL due to the completion of cleanup activities. These remaining

sites include mining sites, landfills, manufacturing facilities, and processing plants that threaten human health and the environment without proper remediation. The Jackpile-Paguate Uranium Mine Superfund site is under the regulatory control of Laguna Pueblo and USEPA and is not managed by the state or SOS. Most neglected AUM sites will not qualify for Superfund listing, as discussed below in Section 3.2.3.

Mining Environmental Compliance Section

The GWQB MECS oversees all the permitting, spill response, abatement, and public participation activities for mining facilities in New Mexico. MECS is part of the GWQB Permitting Program and issues groundwater discharge permits pursuant to the New Mexico Ground and Surface Water Protection Regulations (20.6.2 NMAC) and the Supplemental Permitting Requirements for Copper Mining Facilities (20.6.7 NMAC). MECS also coordinates with MMD of EMNRD to help implement the New Mexico Mining Act and the AML Program by coordinating environmental protection requirements at abandoned mine sites. Additionally, MECS reviews and comments on mine permits and closeout plans and provides determinations that mining operations will meet environmental standards after closure. MECS currently manages over 55 active mining permits. Because MECS primarily deals with active mining operations, neglected AUM sites do not fall under their jurisdiction.

3.1.5 NMED Surface Water Quality Bureau

The NMED Surface Water Quality Bureau (SWQB) works to preserve, protect, and improve New Mexico's surface water quality. The SWQB consists of three sections: the Monitoring, Assessment and Standards Section, the Point Source Regulation Section, and the Watershed Protection Section. The Monitoring, Assessment and Standards Section collects and assesses water quality data for all surface water (lakes, streams, and rivers) in New Mexico, develops surface water quality standards and planning documents, and prepares reports, including 303(d)/305(b) Integrated Reports and Total Maximum Daily Load (TMDL) documents for waters not meeting standards. The Point Source Regulation Section implements ground and surface water protection regulations pertaining to point source pollution discharge permitting and spill reporting. The Watershed Protection Section protects watersheds from nonpoint source pollution by overseeing and funding watershed improvement projects through administration of the Nonpoint Source Program, the Wetlands Program, and the River Stewardship Program. Like the GWQB, the SWQB does not regulate sites where there is not a permit in place, including AUM sites.

3.1.6 NMED Petroleum Storage Tank Bureau

NMED's Petroleum Storage Tank Bureau (PSTB) objectives are to reduce, mitigate, and eliminate the threats to the environment posed by petroleum products or hazardous material or wastes release from underground and above ground storage tanks. PSTB accomplishes these objectives by preventing leaks and spills through inspections, monitoring, testing, installation, and removal of storage tanks. As well as through the investigation and cleanup of leaks and spills from orphaned petroleum storage approximately 1,900 sites. Should an AUM also have petroleum storage tank-related contamination, the tank and related contamination may be cleaned up under the PSTB program. Substances regulated as hazardous waste under the federal Resource Conservation and Recovery Act (RCRA), above-ground storage tanks smaller than 1,320 gallons or larger than 55,000 gallons, and spills of oil or petroleum that were not released from a tank are not covered by the Petroleum Storage Tank Regulations nor are they eligible for assessment and/or remediation under PSTB. Most, if not all, AUM sites will not qualify for PSTB cleanup because they did not have storage tanks.

3.1.7 NMED Hazardous Waste Bureau

The NMED Hazardous Waste Bureau (HWB) ensures that hazardous waste is managed effectively and that contaminated sites are properly cleaned up. The HWB provides regulatory oversight through permitting, conducts inspections under the New Mexico Hazardous Waste Act (Sections 74-4-1 through 74-4-14 NMSA 1978), and supplies technical guidance to New Mexico hazardous waste generators and treatment, storage, and disposal facilities. Additionally, the HWB responds to hazardous waste spills and releases, as well as situations involving abandoned hazardous substances. The HWB primarily focuses on permitted hazardous waste generators and facilities and does not outline any responsibilities related to AUMs.

3.2 Federal and Tribal Regulatory Framework

Sites that are located on federal land fall under federal programs. Similarly, sites that are located on tribal lands fall under the jurisdiction of the sovereign tribe. The state of New Mexico does not have regulatory authority over AUM sites on tribal lands. The role of federal and tribal agencies and programs regarding AUM sites are summarized in this section.

3.2.1 Nuclear Regulatory Commission

The United States Nuclear Regulatory Commission (NRC) regulations that protect the public from radiation apply to Technologically Enhanced Naturally Occurring Radioactive Material (TENORM), or radioactive materials that have been concentrated or made accessible as a result of human activities and do not apply to materials that were only mined (EMNRD and NMED, 2016). Therefore, soils, sediments, and groundwater contaminated by uranium ore and mine waste at AUM sites do not fall under NRC jurisdiction.

3.2.2 United States Department of Energy Office of Legacy Management: Defense-Related Uranium Mines Program

The National Defense Authorization Act for Fiscal Year 2013 mandated that the United States Department of Energy (DOE) prepare a report to Congress on AUMs that had produced ore for purchase by the former United States Atomic Energy Commission. In August 2014, after consulting with other federal agencies, affected state agencies, tribal nations, and the public, DOE presented the Defense-Related Uranium Mines (DRUM) Report to Congress (DOE, 2014). The report identified 4,225 uranium mines, most of which were abandoned, that supplied the former Atomic Energy Commission with ore between 1947 and 1970 (DOE, 2014). Around 75.9 million tons of uranium ore were produced for defense-related purposes; and of that, over 52 million tons (68.5%) were produced from New Mexico mines (DOE, 2023). The DOE (2014) DRUM Report to Congress found that most uranium ore production was from very large mines (>500,000 tons of ore) in New Mexico, including mines on the Navajo Nation and Laguna Pueblo lands. The DOE Office of Legacy Management (DOE-LM) subsequently developed a strategy to address the risks posed by AUM sites that produced uranium for defense-related purposes by leveraging DOE-LM and partner agencies (i.e., land management, regulatory, state, tribal) with a one-government approach to optimize and expediate reduction of risk to human health and the environment (DOE, 2020). The primary goal of the DRUM Program is to identify, access, and safeguard sites that pose "unacceptable risk to the public" (DOE, 2020).

DOE-LM is sequentially implementing evaluations of AUM sites through a Verification and Validation (V&V) program for sites that fall under the DRUM Program on public land first (2017-2022), then tribal land (2023-2028), and then private property (2024-2029) (DOE, 2020). V&V field inventory activities are summarized in site-specific reports that provide information on the site location, potential risks and safety hazards, and surface reclamation or groundwater remediation status to exchange data with other federal agencies and state governments. As of April 30, 2023, approximately 2,362 AUMs on public land had been visited and evaluated for safety hazards. Annual progress reports (e.g., DOE, 2022b) detail the DRUM Program activities. In New Mexico, recent DRUM Program accomplishments include collaborations with Laguna Pueblo, Zia Pueblo, Zuni Pueblo, the Navajo Nation Environmental Protection Agency (NNEPA) and Navajo Abandoned Mine Lands Reclamation Department (NAMLRD), as well as updating the DRUM program database with safeguarding project data (DOE, 2022b).

In 2015, as a follow-up to the 2014 DRUM report to Congress, DOE and their collaborators formed the multi-agency Abandoned Uranium Mine Working Group (AUMWG) with the USEPA, the United States Department of the Interior (DOI), and the United States Department of Agriculture (USDA) to develop a coordinated approach to the assessment and cleanup of AUMs. Although there is no comprehensive federal program, the AUMWG agencies are using their authority to inventory, assess, clean up and conduct long-term monitoring and maintenance of AUMs (DOE, 2022a).

Much of the defense-related uranium ore production between 1947 and 1970 came from mines in New Mexico.

3.2.3 United States Environmental Protection Agency

The USEPA leads continuing efforts to execute enforceable agreements with RPs for mine cleanup, implement TRONOX settlement (discussed in Section 4), oversee trust settlements, and conduct Superfund response actions. USEPA regulates soil concentrations of radioactive elements in uranium mine waste, groundwater, and other impacted media.

Superfund/CERCLA

The USEPA-administered CERCLA regulation was enacted in 1980 and has become known as 'Superfund,' the name given to the Trust Fund the act created. The Superfund program evaluates contaminated sites and decides if a site has sufficient hazards to be placed on the NPL. The NMED SOS and MECS coordinate and work cooperatively with USEPA to identify, investigate, and remediate inactive hazardous waste sites and oversee agreements between the state and the RPs, as discussed in Section 3.1.4.

Most AUM sites are not expected to get a hazard ranking high enough to be placed on the NPL based on the current knowledge of the sites. Nationwide, only three uranium mines are on the NPL, including one in New Mexico, the Jackpile-Paguate Uranium Mine (USEPA, 2023a). However, 34 other uranium mine sites are being evaluated by Superfund, and 17 of these uranium mine sites under evaluation are in New Mexico (USEPA, 2023a). While many of the remaining uranium mine sites throughout the State may not qualify to be placed on the NPL, they may still be threats to human health and the environment.

Through CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Volume 28, Part 300 (2015), USEPA authorizes removal responses at sites when contamination poses an immediate threat to human health and the environment. These removal responses are classified as emergency, time-critical and non-time critical removal actions and can be used to address impacts at sites that are not on the NPL (DOE, 1998, USEPA 2023b). These actions can be accomplished through coordination between State agencies and regional USEPA offices and through the establishment and implementation of Cooperative Agreements.

3.2.4 United States Bureau of Land Management

The BLM's mission statement is to "sustain the health, diversity, and productivity of public lands" (BLM, 2023b) and it is responsible for managing over 247 million acres of land in the United States. The DOI BLM state office in New Mexico, along with Colorado, Utah, and Wyoming, holds a Memorandum of Understanding (MOU) with DOE to address DRUM sites. Of the 4,225 DRUM sites identified nationwide, the DOE has identified at least 2,013 DRUM sites on BLM lands (BLM, 2018). BLM is actively involved with the assessment and cleanup of DRUM sites on BLM-managed land. However, the rate of progress of work at those sites is constrained by available funding, discussed in Section 4.

Through its authority as a response agency under CERCLA and as a resource manager under the Federal Lands Policy and Management Act, the BLM is responsible for addressing AML issues on lands managed by BLM. The BLM's AML program enhances public safety by reducing or eliminating the effects of past mining activities. The BLM maintains an inventory of known AMLs on BLM-managed lands, most of which are abandoned hardrock mines (gold, silver, lead, and uranium). Approximately 80% of the 57,586 AML sites need further investigation and/or remediation (BLM, 2017). BLM's Surface Management regulations (43 CFR Subpart 3809) to eliminate the burden of future abandoned mines on BLM-managed lands became effective on January 1, 1981.

3.2.5 United States Forest Service

The USFS manages approximately 193 million acres of land and has a mission to "achieve quality land management under the sustainable multiple-use management concept to meet the diverse needs of people" (USFS, 2023). Watershed protection and restoration is one of the primary goals established by the USFS in their Strategic Plan, including cleanup of AMLs. As many AML sites involve a combination of federal, state, and private lands, the USFS actively seeks partnerships to leverage funds and maximize cleanup accomplishments on a watershed scale. The USFS is an active collaborator with the AUMWG and has partnered with USEPA regions, states agencies, and DOE to collectively address AUMs on USFS-managed land (DOE, 2022a). USFS is involved with the assessment and cleanup of AUMs to a degree proportionate with available funding through the USFS AML program and through its authority as a response agency under CERCLA. USFS has a reclamation policy (FSM 2840) and financial surety program in place to ensure lands disturbed under current mining activity leases are reclaimed to conditions consistent with resource management plans to eliminate additional abandoned mine issues in the future.

3.2.6 Navajo Nation

New Mexico State agencies do not have authority on tribal lands, therefore cleanup of AUM sites located on tribal lands is being led by the tribes themselves. Of the 23 Native American tribes in New Mexico, the Navajo Nation is the largest and has the largest number of AUM sites located on or near Navajo lands. The Navajo Nation lands cover an area of approximately 27,000 square miles, extending across northwestern New Mexico into northeastern Arizona and southeastern Utah. Ongoing efforts to address the health and environmental risks associated with legacy uranium mining on Navajo Nation lands are detailed in a Ten-Year Plan (USEPA, 2021), which is an inter-agency cooperation with USEPA, NNEPA, Bureau of Indian Affairs (BIA), DOE, NRC, Indian Health Service, and the Agency for Toxic Substances and Disease Registry.

Navajo Nation EPA

Since 2008, USEPA and NNEPA has conducted preliminary investigations at all 523 known AUMs on or near Navajo Nation; completed 113 detailed assessments including their 46 top priority mines; cleaned up over 50 contaminated structures; provided safe drinking water to over 3,800 homes in AUM regions in partnership with the Indian Health Service; and completed cleanup, stabilization, and/or fencing at 29 mines (USEPA, 2021).

Federal assessments and cleanup activities on Navajo Nation lands are summarized in annual reports, most recently in July 2022 (USEPA, 2022a). Funding for the assessment and cleanup of 230 of the 523 AUMs has been secured through enforcement agreements, trust settlements, and settlements with private companies (i.e. Tronox Settlement, discussed further in Section 4). Uranium cleanup efforts are underway on the Navajo Nation at sites that have a viable RP. The NRC is currently working with Navajo Nation to approve a proposal to construct a mine disposal cell atop the existing uranium mill tailings cell of the United Nuclear Corporation Church Rock mill site.

NNEPA runs the Navajo Nation Superfund Program (NNSP) within its Waste Regulatory and Compliance Department. NNSP implements the Navajo Nation CERCLA and partners with the USEPA to implement CERCLA on Navajo Nation lands. The NNSP addresses AUMs on Navajo Nation, among other contaminated sites (NNEPA, 2023). USEPA is working closely with the Navajo Nation to develop contracts that incentivize creating employment opportunities for Navajo residents and prioritizing selection of Navajo- and other Native American-owned firms and contractors to ensure Navajo communities benefit economically from the ongoing work to clean up their land.

Navajo Abandoned Mine Lands Reclamation Department / Uranium Mill Tailings Remedial Action Department

The NAMLRD/Uranium Mill Tailings Remedial Action (UMTRA) Department operates under the Division of Natural Resources within the Executive Branch of the Navajo Nation. The NAMLRD/UMTRA Department was formed in 1988 to address abandoned mine lands cleanup on Navajo Nation lands. The NAMLRD/UMTRA Department has reclaimed 273 coal, 913 uranium, and 33 copper mine sites since 1989 on Navajo lands (NAMLRD, 2023).

The UMTRA Program of the NAMLRD/UMTRA Department was approved by the DOE in 1985 through a Cooperative Agreement. Its purpose is to remediate four UMTRA sites on Navajo Nation lands pursuant to the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). These Navajo Nation UMTRA sites are located in Tuba City, Arizona; Monument Valley, Arizona; Mexican Hat, Utah; and Shiprock, New Mexico.

Neglected AUM sites on federal lands fall under federal programs and neglected AUM sites on tribal lands fall under the jurisdiction of the sovereign tribe.

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4 - Funding Mechanisms for Cleaning Up Contaminated Sites

The state and federal agencies and programs discussed above in Section 3 are summarized in Attachment 1 along with the funding mechanisms that exist for surface reclamation or groundwater remediation. Key state and federal programs that provide funding for the cleanup of contaminated sites are described below, along with the reasons that neglected AUM sites may or may not be able to be addressed by these agencies or under these programs. Attachment 1 provides a more complete summary of the state and federal programs with funding mechanisms along with the applicability of the program and funds for neglected AUM sites.

AUM sites may leave unsafe materials exposed to the air; however, there is often not a funding mechanism or appropriate program for cleanup of contaminants in soil and groundwater.

4.1 Uranium Mining Reclamation Revolving Fund

HB164 established the UMRRF, which is designed to receive appropriations, gifts, grants, donations, and money from the federal government, state agencies, and other sources for conducting uranium mine cleanup. In addition, money recovered for the state from uranium mine or mill cleanup, litigation, or settlement actions will also go to the UMRRF. At this point, UMRRF does not have any available funds for assessment or cleanup of neglected AUM sites. Careful consideration is required to determine how to best use this new funding source once it is funded.

4.2 MMD AML Fund

The Office of Surface Mining Reclamation and Enforcement (OSMRE) within the DOI funds state and tribal AML programs. OSMRE administrates a fee levied on active coal mines, which supports the AML Fund. The AML Fund finances projects to reclaim pre-SMCRA abandoned coal mines. Non-coal abandoned mines may also be reclaimed using the AML Fund if surface reclamation is necessary to protect the public and/or the environment from extremely dangerous adverse effects. This is regularly interpreted by the AML Program to mean open mine features presenting an immediate hazard and does not include the waste rock piles and tailings commonly associated with hard rock mines. The use of funds for non-coal mine sites must be approved by OSMRE. Due to this interpretation, funding is often not directed to non-coal abandoned mines, including neglected AUMs.

4.3 Brownfields Revolving Loan Fund

As discussed in Section 3, TBAs are federal grants available to governmental, tribal, or nonprofit entities to conduct brownfields assessments. NMED also offers low-interest cleanup loans through its Brownfields Revolving Loan Fund for Brownfields sites with a RP. Both the TBAs and the Brownfields Revolving Loan Fund are only available when a willing participant comes forward to seek brownfields assistance for remediation efforts. The Brownfields Revolving Loan Fund is not applicable for most AUM sites with no RP, unless a willing participant steps up.

4.4 Corrective Action Fund

NMED's PSTB administers the Corrective Action Fund (CAF) established by the New Mexico Groundwater Protection Act (Hazardous Waste Act, Sections 74-4-1 through 74-4-14 NMSA 1978) to investigate, clean up, and monitor leaks and spills from neglected petroleum storage tanks. Since 1992, the CAF has been used to clean up approximately 1,900 sites. Should an AUM also have petroleum storage tank-related contamination, this fund may apply, however most, if not all, AUM sites will not qualify for PSTB cleanup using CAF funding.

4.5 Tronox Settlement

In 2014, more than $5 billion was recovered from litigation settlements with Kerr-McGee Corporation and its successor, Tronox Incorporated (Tronox), to provide USEPA with funds to assess and clean up contaminated sites across the country, including nearly $1 billion to clean up approximately 50 uranium mines formerly owned by Kerr-McGee Corporation on or near Navajo Nation lands (USEPA, 2016). The Kerr-McGee Corporation mined more than 7 million tons of uranium ore from the mines on New Mexico and around Navajo Nation from the 1940s through the 1980s (USEPA, 2022b). Approximately $45 million was allocated to the Navajo Nation to address the Shiprock Uranium Mill Site. The USEPA received almost $90 million for the Quivira mine sites (USEPA, 2022c). The remaining funds are mandated to be spent on addressing contamination at other uranium mine sites listed in the Tronox Settlement, including 34 mines in USEPA Region 9 and 20 mines in USEPA Region 6 in New Mexico (USEPA, 2022b). Because the Tronox mine sites have a RP and are restricted to the mines called out in the settlement they are not considered to be neglected AUM sites.

4.6 Other Federal Funding

Some other federal funds exist for cleanup of hazardous sites that may or may not address neglected AUMs in New Mexico, depending on circumstances described below:

The DOE DRUM program funds the safeguarding of physical hazards for AUM sites but does not fund assessment or cleanup of soil or groundwater contamination at AUM sites. The V&V reports developed by the DRUM program will allow New Mexico to inventory the AUM sites and help the state understand the need for funding and efforts towards characterizing the neglected AUMs.

The Superfund program, administered by USEPA, assesses and cleans up the most contaminated sites around the United States, as discussed in Section 3. Currently there are 17 uranium mine sites in New Mexico that are under evaluation for inclusion in the Superfund program and one site, the Jackpile-Paguate Uranium Mine that is undergoing cleanup and listed on the NPL (USEPA, 2023a). Many of the of the neglected AUM sites throughout New Mexico will not qualify to be reclaimed by the Superfund program and related funds.

BLM currently leverages program funding, existing agreements, and available federal funding to continue its response actions at the high priority AUM sites on BLM-managed land already identified. Additional federal funding would specifically allow BLM to complete preliminary assessments and site inspections of neglected AUMs on BLM-managed land.

The USFS leverages funding through its AML program to address AUMs on land managed by the USFS. The funding available through the USFS AML program is limited and so only a select number of sites can be addressed at a time. Additional funding focused specifically for neglected AUMs on USFS-managed land would permit the USFS to conduct a complete an AUM inventory and evaluate these sites for potential releases to the environment and then address cleanup of the neglected AUM sites (DOE, 2022a).

4.7 Summary of Funding Mechanisms for AUM Cleanup

The funds described above, and other funds for various water and environmental purposes in New Mexico are included in Attachment 1. Many of the funds listed in Attachment 1 cannot be used for cleanup of neglected AUM sites. There is no single funding mechanism in place to address neglected AUMs specifically, even though there are some federal and state funding mechanisms to address safeguarding and limited surface reclamation. Previously, there was no funding mechanism in place to assess or address potential groundwater impacts at neglected AUMs, but the creation of the UMRRF by HB164 was a first step.

5 - Examples of Neglected AUMs

Examples of neglected AUM sites are presented in this section. In these examples, the physical hazards and soil radiation levels have been assessed and/or addressed. None of these neglected AUMs have had groundwater assessed for radiological contaminants and some have had only limited soil sampling.

The Poison Canyon trend in McKinley County presents ongoing hazards despite previous MMD AML safeguarding and would likely benefit from further NMED assessment. The Barbara J Mine, part of the Poison Canyon trend, is undergoing safeguarding under the MMD AML Program. Also presented below is an example of successful surface reclamation for five neglected AUM sites in the Cibola National Forest conducted by the USFS. And finally, the Bear Canyon Group Mine in Lincoln County is summarized as a neglected AUM that the DRUM Program found to not present a hazard.

5.1 Poison Canyon

At least 30 mine and exploration features were identified by the MMD AML Program within the Poison Canyon trend, approximately 15 miles northwest of Grants, New Mexico, in McKinley County. The Poison Canyon trend hosts uranium deposits in sandstones of the Jurassic Morrison Formation and the Todilto Limestone. Approximately 10 million pounds of uranium oxide (U3O8) were produced from 20 mines within the area from 1951 through 1980 (McLemore, 2021). Although the MMD AML Program safeguarded more than a dozen features within the Poison Canyon sites in the 1990s, more openings have been identified and there is still significant risk of exposure to radiological hazards in the area (Jordan et al., 2009). In particular, mineralized, gravel-sized pieces of Todilto Limestone occur as thin layers on the ground surface, emitting high levels of gamma radiation (Jordan et al., 2009; Golder, 2009a). The Poison Canyon area likely requires further evaluation, and funding will be needed to properly assess the area's soil and groundwater. The environmental risks associated with these sites cannot be regarded lightly.

Photographs circa 2009 of the Poison Canyon Mine Screening Assessment, conducted by USEPA Region 6.

5.2 The Barbara J Mine

The Barbara J Mine within the Poison Canyon trend is one of the many AUMs where mine features are currently being reclaimed under a CERCLA time-critical removal action in conjunction with the BLM. The Barbara J Mine orebody produced 8,691 short tons of ore grading 0.20% U3O8, hosted by the Todilto Limestone (Gabelman and Boyer, 1988). Surface reclamation work in the area included mine waste excavation and compaction; shaft, vent, and subsidence feature backfilling; drill hole plugging; revegetation; and mulching of areas disturbed by construction (EMNRD, 2023; USEPA, 2015). Safeguarding is being completed at the Site, following the results of soil sampling and gamma ray surveys in the area (Golder, 2009b). Soil sampling may need to occur to confirm surface reclamation is complete for the Barbara J Mine. In addition, groundwater sampling may need to occur to characterize groundwater impacts of the Barbara J Mine and verify that the site will not pose an ongoing risk to New Mexicans or the environment.

Photographs from USEPA Region 6 Screening Assessment of the Barbara J Mine Site, including an abandoned mine shaft marked with arrow in the top photo, and an abandoned well in the lower photo, measuring 458 feet deep.

5.3 Cibola Uranium Mines

Recently, the USFS coordinated the characterization and surface reclamation of five of the many neglected AUMs in the Cibola National Forest (USFS, 2022) to fulfil CERCLA requirements. Gamma radiation and radium-226 were the primary constituents of concern and were measured in high enough concentrations to be hazardous to humans and the ecosystem. No viable RP that could have contributed to the cleanup was found.

Four of the AUM sites—Zia, La Jara, Taffy, and Vallejo mines—are in the Grants mining district near Grants, New Mexico, within the Mt. Taylor Ranger District of the Cibola National Forest. The fifth AUM site, the Abo Mine, is west of Mountainair, New Mexico, in the Mountainair Ranger District of the Cibola National Forest. The surface reclamation included filling of open pits, excavations, adits, waste rock, debris piles and trenches. Clean overburden was used to cover radioactive material left in place and the bedrock. The Zia Mine pits were used as a repository for contaminated, radiological material from all five of the reclaimed mines. A 3.5-foot thick evapotranspiration cover was constructed over the repository. Cleanup was completed in June 2016, at a total cost of $1,979,343.22.

5.4 Bear Canyon Group Mine

The Bear Canyon Group Mine, in the Capitan Mountains of Lincoln County, New Mexico, was evaluated by Navarro Research and Engineering Inc (Navarro) on behalf of the DOE for the DRUM Program (Navarro, 2019). No mine-related features were evident since the mine was small and had only consisted of shallow excavations.

The Bear Canyon Group Mine produced approximately 3 tons of ore (coming to less than 1.5 pounds of uranium oxide). There was no elevated gamma radiation recorded by the Navarro (2019) survey. The physical hazard and radiological risk ratings were ranked as “none.” The procedures for AUM validation and verification are detailed in a work plan, most recently revised in February 2022 (RSI ENTECH, 2022). DRUM verification and validation reports, such as the Navarro (2019) survey, can be used by NMED to assign priority to DRUM-evaluated AUM sites.

6 - AUM Programs in Other States

Problems posed by AUMs are not unique to New Mexico. Many states are working to address the physical and environmental hazards that AUMs cause. The AML and AUM programs in several states, including Arizona, Colorado, Texas, Utah, and Wyoming, are discussed below. A review of the programs in other states reveals that AUM sites are currently being addressed in a similar fashion: in conjunction with all other AML projects within state AML programs. No other state appears to have a program dedicated solely to AUM cleanup; the sites are addressed within coal and other non-coal AML programs based on priority level and funds available.

Many states are trying to address the cleanup of mine sites under AML programs, including AUM sites. Each of these states would benefit from a separate AUM-focused program with its own funding to accomplish their AUM cleanup goals.

All the state programs reviewed for this report receive a majority of their funding from legislatively mandated programs/funds, specifically SMCRA-related OSMRE grants. Additional funding for programs from other states rely on a variety of funds/grants from federal agencies (such as the BLM and USFS), state taxes, private entities, and landowners. These funding sources are discussed in further detail for each state. Due to the significant variations between states and the differences in programs, funding summary data should not be used to compare one state to another. Rather, the data should serve as an example for AML and AUM program implementation.

The most successful state AML programs work closely with their local OSMRE division/office, facilitate interagency communication and cooperation as well as draw funds from multiple federal, state, and private sources, allowing for more sites to be assessed and remediated in an effective manner. In general, AUM cleanup efforts in all states would benefit from a separate, AUM-focused program, as long as that program worked with existing agencies, working groups, and funding sources to accomplish their cleanup goals.

6.1 Arizona

In 1992, the Arizona State Mine Inspector (ASMI) began working with the BLM to survey federal lands and inventory abandoned and inactive mines. The program hired college and university student interns from across Arizona to conduct field investigations and create reports. State funding for the program started in 1997, which extended the program to state and privately owned lands. Currently, BLM Arizona has documented approximately 10,000 features in the Abandoned Mine and Site Cleanup Module database (BLM, 2023a). The ASMI also partnered with the National Park Service in 1996 to aid in abandoned mine closures in national parks, monuments, and recreational areas throughout the state. Arizona's Abandoned Mine Safety Fund was enacted in 1998. The fund's objective is to "encourage private contributions that can be used directly to abate public safety risks on State Lands and leverage legislative appropriations to increase funding for this work." Money from the fund can only cover the direct cost of work and cannot be used for administrative expenses. Most of Arizona's AUMs are in the northern part of the state and are located on Navajo Nation tribal trust lands. Because of this, the majority of Arizona's AUMs are addressed through the NNEPA and NAMLRD.

6.2 Colorado

Colorado's Abandoned Mine Land Reclamation Plan was approved by the DOI Secretary on June 11, 1982. The Colorado Inactive Mine Reclamation Program (IMRP) is administered by the Division of Reclamation, Mining, and Safety in Colorado's Department of Natural Resources and has 16.5 full-time equivalent (FTE) staff as of 2022 (OSMRE-DFD, 2022a). Colorado has approximately 23,000 abandoned mine sites located on both public and private land (Colorado Geological Survey, 2023). In Evaluation Year 2022, Colorado started 13 non-coal AML projects and completed 16 non-coal AML projects (OSMRE-DFD, 2022a).

The Colorado IMRP works to address hazards and environmental issues associated with abandoned or inactive "legacy" mines. Non-coal projects include safety closures, water quality improvement projects, and surface reclamation of sites with revoked permits and forfeited financial warranties. Since its inception, IMRP has safeguarded over 10,500 hazardous openings and reclaimed over 4,000 acres of AML across Colorado (Colorado DRMS, 2023). IMRP works closely on mine safety closure projects with many partners, including the BLM, USFS, Colorado Division of Parks and Wildlife, Women in Mining, local governments, mining associations, private citizens, landowners, and the Colorado Scenic and Historic By-Ways Commission.

IMRP consistently engages with various local, regional, statewide, and federal organizations and has a strong commitment to education and outreach. In 2022, the program partnered with Colorado Correctional Industries and Colorado Youth Corps Association to safeguard and reclaim abandoned mines while providing technical training and work experience to participants. IMRP also provides service opportunities to local Boy and Girl Scout Troops and has also presented to and provided mine cleanup field trips for students at Western Colorado University.

Funding for IMRP comes from the traditional SMRCA-funded model through Annual Title IV grants and state severance taxes. IMRP also partners with other agencies to achieve additional AML surface reclamation activities, including the USFS, BLM, United States Geological Survey, DOE and DRUM, private industry, local watershed associations, private landowners, local governments, and stakeholder groups. These groups receive additional funding through the USEPA and/or the Colorado Department of Public Health and Environment. The program has recently begun placing additional emphasis on AUM-related features on the Colorado Plateau (OSMRE-DFD, 2022a).

6.3 Texas

The Texas Uranium Exploration, Surface Mining and Reclamation Act (Texas Natural Resources Code [TNRC] Sec. 131) went into effect in 1977. The Railroad Commission of Texas (RRC) Surface Mining and Reclamation Division oversees the state's AML Reclamation Program. The program is fully funded by the federal OSMRE through a production tax levied on active coal mining operations in Texas, as well as the Land Reclamation Fund outlined in TNRC Sec. 131.231. In 1992, the RRC AML program certified completion of surface reclamation of all inventoried high-priority coal AML sites, allowing the program to use federal AML funds for non-coal AML sites. Following certification, the RRC AML Program focused on non-coal surface reclamation projects, specifically abandoned uranium and cinnabar mine sites (OSMRE-TFO, 2022).

Prior to 1975, 23 uranium pits were mined and abandoned in Texas. These uranium mines typically consist of an open pit (~20 to 120 feet [ft] deep) and associated spoil piles (~20 to 80 ft high with a steep slope of 33% or greater). The pits usually contain collected groundwater 20 to 80 ft deep (RRC of Texas SMRD, 2002). The RRC AML Program completed its first AUM cleanup project in 1988. Between 1988 and 2001, nine AUM cleanup projects were completed, which cost a total of $10,133,675 (RRC of Texas SMRD, 2002).

The program's Mabel New-Superior AUM site was the recipient of the federal OSMRE's 2009 Mid-Continent Regional Award for AML Reclamation. More recently, the RRC AML program has been refocusing surface reclamation efforts toward abandoned coal sites where they can now obtain right of entry. RRC is also reopening investigations into AUMs where right-of-entry was not previously obtained. During Evaluation Year 2022, the Texas AML program staffed 4.7 FTE employees and had a total of $1,126,610 in AML Program Grant Awards, which helped fund the initiation of five AML projects and the completion of three projects (OSMRE-TFO, 2022).

6.4 Utah

Utah's Abandoned Mine Reclamation Program (AMRP) is administered by the Division of Oil, Gas and Mining (DOGM) within Utah's Department of Natural Resources. The program was established in 1983 to address physical safety hazards caused by abandoned mines as authorized by the 1977 SMCRA. There are estimated 17,000 mine openings across the state (Utah DOGM, 2023). The AMRP safeguards abandoned mine sites by sealing off access to openings and cleaning up waste. A State Reclamation Plan was enacted in 1986 by Utah Administrative Code (UAC) R643-884. One of the requirements of the reclamation program is the coordination of surface reclamation work between AMRP, the Rural Land Reclamation Program administered by the Soil Conservation Service, and OSMRE's surface reclamation programs (R-643-884-133.300 UAC). Because the DOGM has an approved state surface reclamation plan, the AMRP is eligible for state reclamation grants under R643-886 UAC.

As of September 2022, the AMRP employs 11 FTE staff with roles in project management, engineering, geographic information systems, environmental compliance, geology, and archaeology (OSMRE-DFD, 2022b). The AMRP works closely with the OSMRE Denver Field Division (DFD) and the BLM. Funding for the program comes from SMCRA-related sources, such as OSMRE and the Abandoned Mine Reclamation Fund (40-10-25.1 UAC), as well as The Utah Coal Producers, who pay an abandoned mine reclamation fee to OSMRE for each ton of coal mined in Utah. Noncoal sites can be remediated using these funds under R643-875 UAC. The program is also funded by non-SMCRA sources, such as the DOE and BLM. In 2022, Utah's total AML grant awards and funding was $2.829 million, some of which was used to start four and complete three non-coal AML projects (OSMRE-DFD, 2022b).

Utah's AMRP has been recognized multiple times over the past several years for their AUM surface reclamation efforts. The San Rafael Swell uranium mine closure project, a partnership between BLM and AMRP, won the NAAMLP 2016 Hardrock Abandoned Mine Lands Reclamation Award for Physical Safety Hazards. More recently, AMRP won the same award in 2020 for the 2019 Red and Fry Canyon abandoned mine closure project in San Juan County, Utah, which was described as "a showcase example of interagency cooperation and collaboration to protect public safety while protecting the environment" (Utah DOGM, 2020). The project involved closing 62 hazardous AUM openings and was funded by the BLM and OSMRE.

6.5 Wyoming

Wyoming's Abandoned Mine Land Reclamation Plan was approved in 1981 under Title IV of SMRCA, allowing for the Wyoming Department of Environmental Quality to operate the Abandoned Mine Reclamation Program. Administered by the Wyoming Department of Environmental Quality, the Wyoming Abandoned Mine Lands Division (WYAMLD) implements the approved State Reclamation Plan and the Abandoned Mine Land Program (WYAMLP). As of July 1, 2021, WYAMLP had 12.5 FTE staff (OSMRE-DFD, 2022c); these employees are distributed between an administrative office and a field office. The WYAMLD works closely with the OSMRE-DFD Casper Area Office, which described the state as having "a superior AML program in full compliance with its approved [Abandoned Mine Land Reclamation] Plan" (OSMRE-DFD, 2021). The WYAMLP typically hosts an annual AML staff meeting, bringing together federal stakeholders and state agencies to provide the Casper Area Office staff with updates on AML projects and to allow for coordination of activities among various stakeholders associated with the WYAMLP.

During Evaluation Year 2022, WYAMLP received a total of $32,975,498 in grant funding; of that total funding, WYAMLP spent $6,198,665 on AUM surface reclamation project costs spanning five AUM projects (OSMRE-DFD, 2022c). The program received $35,801,324 in total funding during Evaluation Year 2021 and spent $7,353,677 on AUM surface reclamation costs across 10 projects (OSMRE-DFD, 2021). These costs covered different types of surface reclamation problems, including mine openings, subsidence, hazardous water bodies, dangerous piles and embankments, hazardous equipment/facilities, pits, etc.

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7 - Barriers and Benefits in Addressing Neglected AUM Sites

A lack of resources is the primary barrier to tackling neglected AUMs in New Mexico and the potential threats they pose. AUM restoration projects require large investments of funds over a period of many years. Though HB164 establishes a reclamation fund (the UMRRF), it has yet to receive any monies from the state. The price range for an initial site assessment with sampling may exceed $25,000 to $100,000. Additional sampling may then be needed to fully characterize the contamination and design a cleanup program. Subsequent cleanup typically costs even more, and it can take many years to successfully cleanup a site, depending on the type and extent of the contamination. The cost to physically safeguard a site and remediate soil and groundwater may exceed several million dollars.

Another barrier to addressing neglected AUMs is the fact that there are many different state and federal agencies and working groups, programs, and funds that partially address AUM and neglected AUM sites in New Mexico. Furthermore, though NMED is experienced in cleaning up many different types of contaminated sites, NMED does not have a history of cleanup of AUM sites. Additionally, although HB164 directs NMED to address the AUM sites, NMED does not have an established program or adequate staff to carry out or oversee neglected AUM site assessments, investigations, and cleanup. Although the cost associated with cleaning up neglected AUM sites with contamination and hazards can be high, the benefits, including those listed below, lead to a healthier and more prosperous New Mexico:

- Protecting natural resources for the future
- Protecting the health of New Mexicans
- Deterrence of trespassing at abandoned and dangerous AUMs
- Protecting humans by safeguarding site access
- Improved air quality and groundwater quality
- Carbon sequestration through improved soil health
- Improved wildlife habitat
- Improved recreation opportunities
- Increased property values near remediated sites

The main barriers to addressing neglected AUM sites are a lack of resources, the need for an established program, and developed guidelines for implementing assessment and cleanup.

The recommended actions for removing the barriers that exist for cleaning up neglected AUM sites (excluding sites on tribal lands or federal lands) in New Mexico are summarized in Figure 4. An AUMC Program will allow NMED to develop a rulemaking process, define its regulatory authority, the objectives of the program, and hire staff to manage the cleanup of AUM sites. The AUMC program can then develop implementation guidelines for the AUMC staff to follow. In addition, the AUMC program can identify and evaluate appropriate ways to fund the UMRRF so there is sustainable source of funds for ongoing assessment and cleanup of neglected AUM sites throughout the state.

Figure 4. Recommended Actions for Removing Barriers to Cleanup of Neglected AUM Sites excludes AUMs located on tribal lands and federal lands)

Establish Abandoned Uranium Mine Cleanup (AUMC) Program

- Develop rulemaking process
- Define regulatory authority
- Hire staff to manage AUMC program

Define objectives of the AUMC program

Develop AUMC Implementation Guidelines

- Work with other agencies to implement guidelines
- Develop process for assessment and cleanup of neglected AUM sites
- Identify appropriate cleanup standards
- Identify neglected AUM sites that fall under the AUMC program

Fund the UMRRF

- Identify appropriations
- Solicit gifts and donations
- Identify and apply for grants and federal funding
- Identify other funding sources







8 - Proposed Abandoned Uranium Mine Cleanup Program

The state recognizes that the AUM problem in New Mexico is large and complex. Inter-agency cooperation is essential, as are clear guidelines for RPs. Current guidelines, in addition to the regulatory framework discussed in Section 3, for uranium operations include:

- a joint guidance document between EMNRD and NMED (2016) for addressing soil radiation at existing uranium mines as part of cleanup activities, and
- MMD guidance for meeting cleanup requirements at new uranium mining operations (2016),
- NMWQCC regulations, as applicable for protection of groundwater and surface water (see Section 3), and
- New Mexico Mining act, as applicable for surface reclamation (see Section 3).

Presently, as resources allow, MMD investigates and safeguards neglected AUMs that have no discernible RP. So far, limited resources through MMD's AML program and its partnerships have enabled a relatively slow pace of neglected AUM surface cleanup as the state grapples with many other mining-related environmental issues. A proposed approach for conducting the assessment and cleanup of neglected AUM sites in New Mexico is provided in Figure 5. First, an AUMC Program should be established to help NMED define the regulatory authority, develop the objectives of the program, and hire staff to manage the assessment and cleanup of neglected AUM sites.

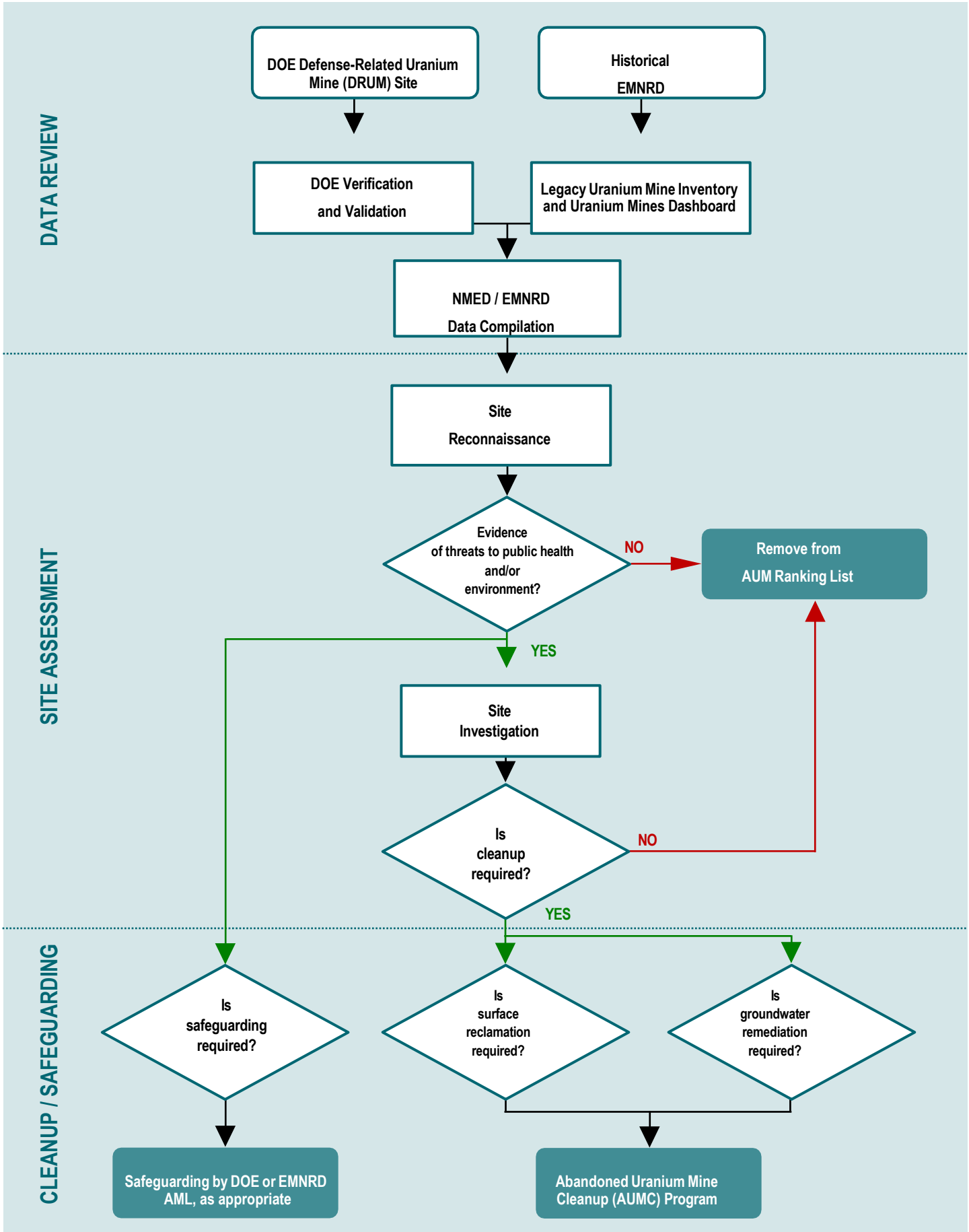
An effective AUMC program will need to conduct thorough data compilation and a robust AUM geodatabase in order to conduct an efficient and comprehensive review and ranking of the 260 identified AUMs in New Mexico. The AUM geodatabase will also allow NMED to identify and prioritize the neglected AUM sites. To avoid duplicating efforts in site characterization, all

The risks that neglected AUM sites pose to human health and the environment far outweigh the costs needed to establish a sustainable fund to provide the resources and appropriately address them.

available information related to a site should be reviewed. The DOE DRUM Program Verification and Validation reports, airborne radiological surveys (where available), as well as historical EMNRD MMD AUM inventories provide NMED with a large amount of information to compile and review. Once a thorough review has been completed, NMED can rank the neglected AUM sites for an initial site assessment based on the potential hazards at each site (Figure 5). The priority ranking for sites could include the following rankings:

- **Low priority:** sites that were evaluated via the DOE DRUM Program or EMNRD MMD programs and found to have little to no physical, radiological, or other threat.
- **Moderate priority:** sites that may have a physical, radiological, or other threat based on DOE DRUM or MMD evaluations, or if there is no available information.
- **High priority:** sites that are likely to have physical, radiological, and/or other threat based on DOE DRUM or MMD evaluations, sites that are in close proximity to populated areas, sites that are in close proximity to surface water and/or groundwater, or if the mine is known to be "wet."

Figure 5. Proposed Phases for Assessment and Cleanup of AUM Sites in New Mexico



The first step for the neglected AUM site assessment would include site reconnaissance that, in addition to the data review, may include a site visit and limited sampling. The site reconnaissance may cost between $25,000 and $100,000 per AUM site, depending on the site location and available information.

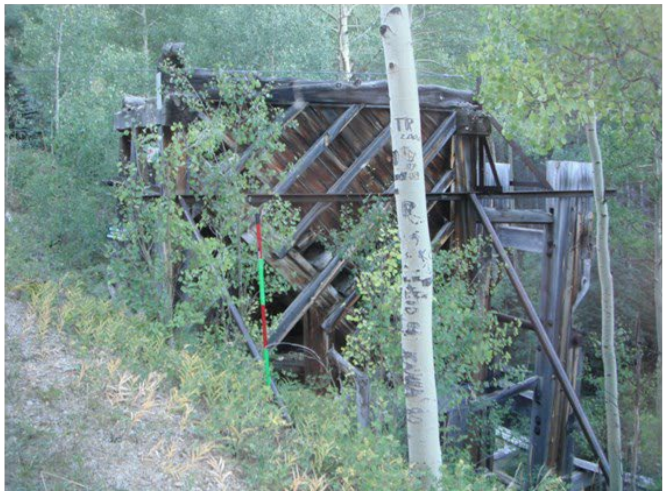
For those neglected AUM sites initially ranked as moderate or high priority, or sites found likely to pose a threat to human health and/or the environment, a more in-depth site investigation and funding may be required (Figure 5). A site investigation may include more extensive soil and/or surface water sampling, ground-based radiological surveys, and/or groundwater sampling. For this level of site investigation, the NEPA process will need to be followed and may include biological and archeological surveys to assess the environmental impacts of the investigations. In addition, the groundwater sampling may require drilling and installing monitoring well(s). An in-depth site investigation may cost as little as $80,000 but could cost more than $1,000,000, depending on the site and level of investigation required.

Based on the results of data review, the site reconnaissance, and the site investigation, the neglected AUM site may be assigned a final priority level based on threat: low, moderate, or high. High priority sites will require additional funds to develop and implement cleanup through the AUMC Program. The funds needed for cleanup could be in the range of tens of thousands of dollars for simple safeguarding measures to multiple millions of dollars for extensive soil reclamation and/or groundwater remediation, as well as the safe disposal of radioactive material.

Neglected AUM sites that qualify for the AUMC Program should adhere to cleanup standards summarized in the EMNRD and NMED joint guidance for existing operations (2016), and those set by USEPA where appropriate, NMWQCC regulations as applicable, and follow any promulgated rules addressing cleanup of AUM sites. Alternative concentration levels in soils and groundwater may have to be applied, depending on the site's natural background levels, the limits of available remediation techniques, and the site's proximity to human settlements.







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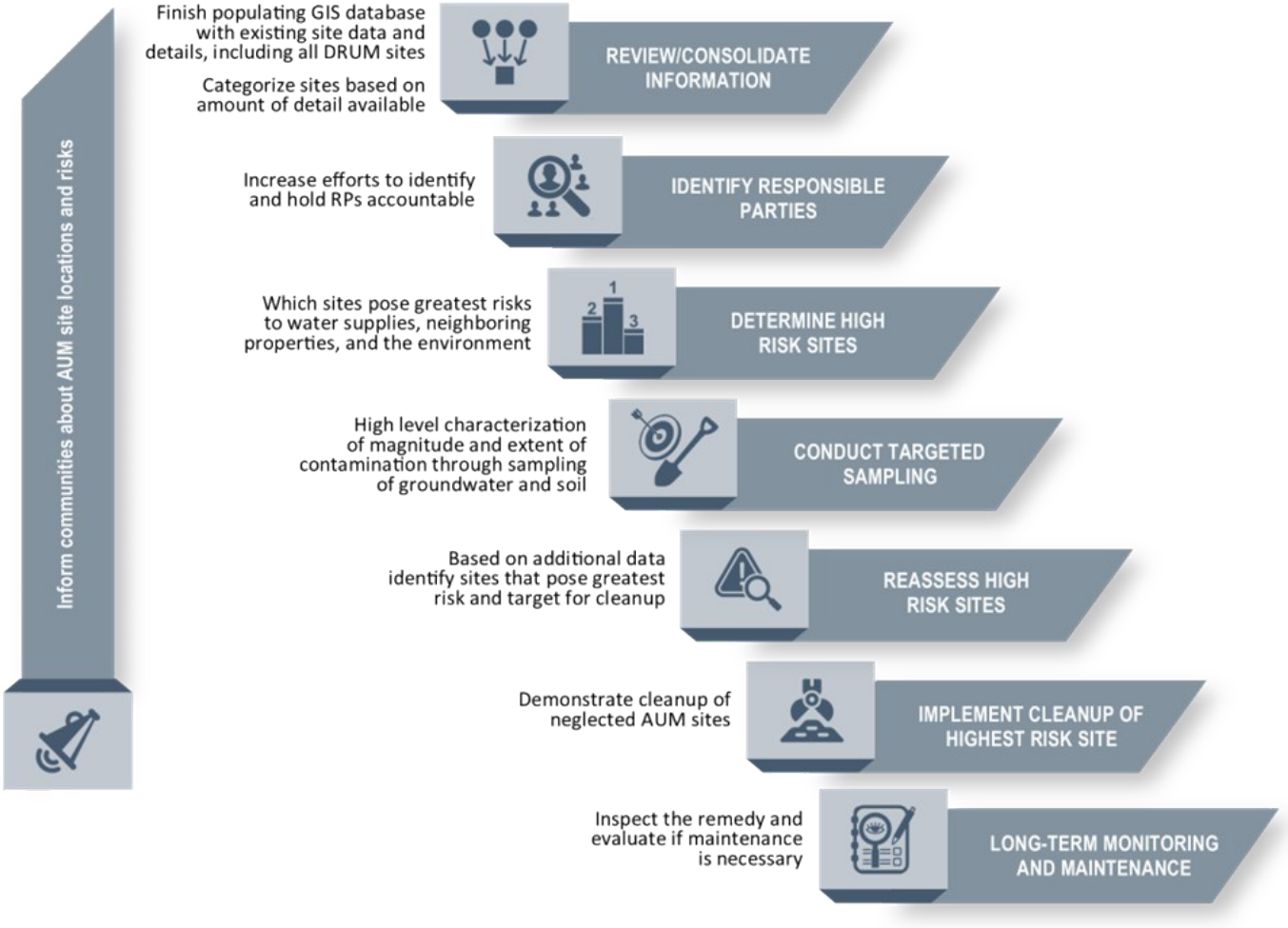
9 - Conclusions

Uranium mines throughout New Mexico and Navajo Nation produced much of the material that gave birth to the Atomic Age in support of national defense efforts. Although the uranium mining boom was incentivized by the United States government, there are still no specific federal laws for addressing AUMs. New Mexico is now left with the legacy of these uranium mine sites and the lasting threat of contamination from un-reclaimed and un-remediated AUMs. Despite comprehensive environmental legislation introduced over the last 50 years, New Mexico is still grappling with how to address the approximately 260 AUM sites in the state, many of which have unknown hazards and unknown threats. Therefore, New Mexico will require additional funding from the federal government or other sources to address the legacy of these mines.

The passage of HB164 is the latest effort to fill the gaps in the regulatory framework for addressing neglected AUMs and to protect the health of New Mexicans. HB164 establishes a fund for cleanup, and a Uranium Mine Reclamation Coordinator position to focus efforts on the neglected AUMs that have previously been overlooked in New Mexico. However, the UMRRF has yet to be funded. In addition, an organized AUMC Program needs to be established and will require a closely coordinated effort between multiple agencies. Once the AUMC Program is set up and the UMRRF funded, the recommended next steps for addressing neglected AUM sites (excluding sites on tribal lands and federal lands) in New Mexico are summarized in Figure 6.

Uranium mine cleanup can be seen as a significant economic opportunity for New Mexico. The work required to characterize and cleanup neglected AUMs demands a range of skills. Every site presents an opportunity for innovation in the fields of engineering, geology, geochemistry, and hydrology.

Figure 6. Recommended Next Steps for Addressing Neglected AUM Sites in New Mexico (excludes AUMs located on tribal and federal lands)



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Attachment 1. Existing State and Federal Funding Mechanisms

Regulatory Framework / Funding Mechanism	Apply to AUMs?	Applicability
State		
New Mexico House Bill 164 (HB164) / Uranium Mining Reclamation Revolving Fund *(forthcoming)*	Yes	Applicable for Uranium Mine Cleanup (UMC) Abandoned Uranium Mines (AUMs): AUM sites that have no Responsible Party (RP), and do not fall under another program.
NM Energy, Minerals and Natural Resources Department, Mining and Minerals Division (EMNRD)/ Abandoned Mine Lands (AML) Fund	Yes	Abandoned coal mines are first priority for AML Funds. Applicable to non-coal mines, including AUMs, with Office of Surface Mining Reclamation and Enforcement (OSMRE) approval.
Brownfields Program / Brownfields Revolving Loan Fund	Maybe	Only applicable when a willing participant comes forward
Petroleum Storage Tank Bureau / Corrective Action Fund	No	Only applicable for tank spills, will not be applicable for most AUMs
New Mexico Finance Authority / Water Project Fund	No	For water conservation, treatment, reuse projects; flood prevention; water storage or conveyance projects; and watershed restoration.
New Mexico Environment Department (NMED) Construction Programs Bureau / Clean Water State Revolving Fund	No	Explicitly for the construction and modification of wastewater facilities.
NMED Construction Programs Bureau / Clean Water Administrative Fund	No	Solely to administer the Wastewater Facility Construction Loan Fund.
NMED Construction Programs Bureau / Rural Infrastructure Revolving Loan Fund	No	Applicable for infrastructure related to domestic water systems, wastewater, and solid waste project in small/rural communities.
NMED Drinking Water Bureau and New Mexico Finance Authority / Drinking Water State Revolving Loan Fund	No	Only applicable for financial assistance to public water systems for repairs and replacement of drinking water infrastructure to meet drinking water regulations and protect public health.
NMED Remediation Oversight Section / Voluntary Remediation Fund	No	Available only for administration and oversight of the state's Voluntary Remediation Program.
NMED Remediation Oversight Section / Responsible Parties Fund	No	Explicitly for the removal of underground storage tanks.
NM Water Quality Control Commission / Water Quality Management Fund	No	Available only for administering regulations adopted by the Water Quality Control Commission.
NMED Hazardous Waste Bureau / Hazardous Waste Fund	No	Explicitly for the administration of the state's hazardous waste program.
NMED / Water Conservation Fund	No	Applies only to conducting testing, assessing, and training for public water supply systems.
NMED / Public Water Supply System Operator and Public Wastewater Operator Fund	No	Available only for administering and enforcing the state's Utility Operators and Certification Program.
NMED / Hazardous Waste Emergency Fund	No	Applicable only for immediate, emergency response and remediation of a hazardous waste contamination spill.
Office of Natural Resources Trustee / Natural Resources Trustee Fund	No	Funds are recovered from RPs and used to restore, replace, or acquire natural resources in an area where natural resources have been damaged, destroyed or lost due to contamination. Only available if there is an RP.
Federal		
Department of Energy Office of Legacy Management Defense-Related Uranium Mines (DRUM) Program	Yes	Applicable for safeguarding at all AUMs that fall within the DRUM Program, not applicable for surface or groundwater reclamation
United States Environmental Protection Agency (CERCLA) / Superfund	Yes	Only applicable for AUM sites on the National Priority List or sites designated under time-critical or non-time critical removal actions
United States Bureau of Land Management / AML funds	Yes	Only applicable for AUMs on land managed by the Bureau of Land Management
United States Forest Service / AML funds	Yes	Only applicable for AUMs on land managed by the United States Forest Service
Navajo Nation Environmental Protection Agency (NNEPA) (with USEPA/CERCLA)	Yes	Only applicable for AUMs on Navajo Nation
Navajo Abandoned Mine Lands (NAML) (with USEPA and NNEPA)	Yes	Only applicable for abandoned mine lands, including AUMs, on Navajo Nation

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Appendix D. NMDWS's Economic Research and Analysis Bureau Skills-matching Report

The New Mexico Department of Workforce Solutions (NMDWS), Economic Research and Analysis Bureau, has reviewed data to evaluate whether the New Mexico workforce possesses the skills necessary to work on Uranium mine cleanup and remediation. Data used comes from the U.S. Bureau of Labor Statistics; Workforce Connection Online System; NMDWS UI Database; and the Integrated Postsecondary Education Data System.

The first part of the report analyzes current employment in establishments and occupations that perform uranium mine cleanup and remediation services. The current demand for these workers, as well as the typical education needed for these industries and occupations, are then notated. The second part of the report analyzes the potential supply of workers.

It is estimated that about 2,500 New Mexicans can feasibly start work doing uranium mine cleanup and remediation work. This figure is made up of the unemployed (715) and program completers (1,796). Please note that this figure is based on dated data and does not consider their current work and residential status or whether they are interested in performing uranium mine cleanup and remediation work.

Current employment in Uranium mine cleanup and remediation:

1. In 2022 there were 91 establishments in New Mexico performing remediation services. Their employment was 1,282. That same year, there were 172 establishments that provided environmental consulting services, with an employment of 1,049.
2. In 2022, nearly 53,000 workers were employed in uranium mine cleanup and remediation occupations in New Mexico. In the Northern Workforce Region, 10,630 workers were employed in these occupations.
3. As of May 2023, there were 500 advertised job openings in the remediation services industry and 114 in the environmental consulting services industry. There were 2,036 advertised job openings in occupations identified as able to do uranium mine cleanup and remediation work.

Potential labor supply of Uranium mine cleanup and remediation workers:

1. Unemployed workers have the educational requirements typically needed to enter an occupation able to do uranium mine cleanup and remediation work, particularly those occupations that require a high school diploma or equivalent.
2. For the week of May 14, 2023, there were 715 claimants receiving unemployment insurance benefits who identified themselves as having a uranium mine cleanup and remediation-related occupation. In the Northwest counties of New Mexico, 366 claimants had been employed in those occupations.
3. For that same week, there were 20 claimants receiving unemployment insurance benefits who had previously worked in establishments performing remediation services and environmental consulting services.
4. In the 2020–2021 school year, there were 1,796 students from New Mexico's postsecondary schools who completed a Classification of Instructional Program (CIP) related to uranium mine cleanup and remediation occupations.
5. Over 90 percent of WorkKeys test takers had the math and reading comprehension skills necessary to be successful in at least one uranium mine cleanup and remediation job for their level of education attainment. (Please note that programs of study and work history are unknown for those test takers).

CURRENT EMPLOYMENT

Establishments that Perform Uranium Mine Cleanup and Remediation Activities

Establishments that primarily do uranium mine cleanup and remediation are typically classified into one of two North American Industry Classification System (NAICS) codes: 562910, Remediation Services, and 541620, Environmental Consulting Services. Their definitions can be found in the appendix.

In 2022, the number of remediation services establishments in New Mexico was 91, with an employment of 1,282 (Exhibit 1). There were 172 environmental consulting services establishments operating in New Mexico employing 1,049 workers.

In the United States, 170,680 workers were employed in NAICS 562900, remediation and other waste management services. Of those, over half worked in occupations in which a high school diploma or equivalent was needed for entry into the occupation (Exhibit 2). Slightly over 1.75 million people worked in NAICS 541600, management, scientific, and technical consulting services. Of those, 67.3 percent needed a bachelor's degree or higher to enter occupations needed for that industry. Nearly one in five needed a high school diploma or equivalent. (Please note that these figures include other establishments besides uranium mine cleanup and remediation services.)

1. Employment and Number of Establishments in Select Industries, New Mexico, Private Ownership Only

	NAICS 562910 Remediation Services		NAICS 541620 Environmental Consulting Services	
Year	Employees	Establishments	Employees	Establishments
2011	563	69	1,027	144
2012	580	71	953	147
2013	602	75	937	147
2014	600	72	932	151
2015	664	70	934	141
2016	619	64	921	142
2017	600	62	956	143
2018	797	72	998	155
2019	1,049	73	1,064	172
2020	1,101	77	1,066	176
2021	1,081	82	997	169
2022	1,282	91	1,049	172

2022 data are preliminary. Source: QCEW

2. Typical Education Needed for Occupations in Uranium Mine Cleanup and Remediation Service Industries, U.S., 2022

	NAICS 562900 Remediation and Other Waste Management Services	NAICS 541600 Management, Scientific & Technical Consulting Services
No formal educational credential	17.0%	3.0%
High school diploma or equivalent	57.6%	23.2%
Some college, no degree	1.7%	2.9%
Postsecondary nondegree award	6.8%	1.6%
Associate's degree	1.3%	2.0%
Bachelor's degree or higher	15.7%	67.3%

Source: U.S. BLS

3. Occupations Associated with Uranium Mine Cleanup and Remediation by Typical Education Needed for Entry, Number of Advertised Jobs, Number of Claimants, WorkKeys Skill Level, and Employment Projections

			Employment, 2022		Advertised Jobs Openings, New Mexico, May 2023	Claimants the week of May 14, 2023		Minimum Skill Level		Employment Projections, 2020–2030	
Occupation	Occ Code	Typical Education Needed for Entry	NM	Northern Workforce Region*		NM	Select Counties **	Applied Math	Workplace Documents	%	Projected Annual Job Openings
Surveyors	171022	Bachelor's degree	310	80	19	4	2	3	5	2.73%	26
Chemical Engineers	172041	Bachelor's degree	80	Confidential	10	1	1	7	6	6.57%	9
Environmental Engineers	172081	Bachelor's degree	220	60	70	2	1	6	6	6.19%	24
Health & Safety Engineers, Except Mining Safety	172111	Bachelor's degree	430	190	38	4	1	3	4	6.69%	24
Industrial Engineers	172112	Bachelor's degree	680	60	1	6	4	3	6	15.17%	36
Mining & Geological Engineers & Mining Safety Engineers	172151	Bachelor's degree	180	Confidential	14	2	2	4	6	3.54%	15
Drafters, All Other	173019	Associate's degree	60	Confidential	20	1	1	3	3	-4.23%	6
Environmental Engineering Technologists and Technicians	173025	Associate's degree	30	Confidential	8	1	1	3	3	10.00%	5
Industrial Engineering Technologists and Technicians	173026	Associate's degree	Confidential	10	35	1	0	3	3	Confidential	Confidential
Calibration Technologists and Technicians	173028	Associate's degree	130	20	1	0	0	3	3	Confidential	Confidential
Surveying and Mapping Technicians	173031	High school diploma or equivalent	760	190	16	4	1	3	3	5.89%	118
Biological Scientists, All Other	191029	Bachelor's degree	300	70	87	5	4	5	7	0.00%	21
Conservation Scientists	191031	Bachelor's degree	250	70	1	4	1	4	5	4.45%	24
Chemists	192031	Bachelor's degree	240	Confidential	42	1	1	6	7	7.93%	33
Environmental Scientists and Specialists, Including Health	192041	Bachelor's degree	1,470	800	2	3	1	5	7	10.93%	155
Geoscientists, Except Hydrologists and Geographers	192042	Bachelor's degree	170	50	14	0	0	6	7	6.85%	31
Hydrologists	192043	Bachelor's degree	90	Confidential	12	0	0	6	7	10.60%	18
Environmental Science & Protection Techs, Including Health	194042	Associate's degree	380	130	63	1	0	3	5	12.56%	57
Geological Technicians, Except Hydrologic Technicians	194043	Associate's degree	Confidential	Confidential	15	2	0	5	5	Confidential	Confidential
Hydrologic Technicians	194044	Associate's degree	60	Confidential	1	0	0	3	3	Confidential	Confidential
Forest and Conservation Technicians	194071	Associate's degree	950	370	11	2	0	3	4	2.46%	111
Occupational Health and Safety Specialists	195011	Bachelor's degree	1,050	390	77	5	1	3	4	12.11%	99
Occupational Health and Safety Technicians	195012	High school diploma or equivalent	50	Confidential	16	3	2	3	4	10.75%	8
Supervisors of Construction Trades & Extraction Workers	471011	High school diploma or equivalent	5,880	1,230	48	26	14	3	4	10.33%	796
Construction Laborers	472061	No formal educational credential	10,380	1,930	123	214	117	3	3	9.42%	1,413
Paving, Surfacing, and Tamping Equipment Operators	472071	High school diploma or equivalent	180	30	3	15	6	3	3	Confidential	Confidential
Operating Engineers & Other Construction Eqpt Operators	472073	High school diploma or equivalent	4,440	880	171	74	38	3	3	8.25%	508
Helpers, Construction Trades, All Other	473019	No formal educational credential	150	40	7	5	3	3	3	12.67%	31
Construction and Building Inspectors	474011	High school diploma or equivalent	580	110	55	6	1	5	5	-4.32%	61
Fence Erectors	474031	No formal educational credential	160	20	1	1	1	4	3	11.34%	39
Hazardous Materials Removal Workers	474041	High school diploma or equivalent	440	200	7	3	3	3	4	7.80%	60
Earth Drillers, Except Oil and Gas	475023	High school diploma or equivalent	60	10	1	0	0	3	3	Confidential	Confidential
Underground Mining Machine Operators, All Other	475049	No formal educational credential	Confidential	Confidential	2	11	9	3	4	Confidential	Confidential
Heavy and Tractor-Trailer Truck Drivers	533032	Postsecondary nondegree award	10,790	1,790	459	137	78	3	3	9.91%	1,510
Locomotive Engineers	534011	High school diploma or equivalent	350	Confidential	1	4	0	3	3	Confidential	Confidential
Railroad Conductors and Yardmasters	534031	High school diploma or equivalent	350	Confidential	4	2	0	3	4	Confidential	Confidential
Transportation Inspectors	536051	High school diploma or equivalent	210	30	3	9	3	3	3	0.81%	13
Conveyor Operators and Tenders	537011	No formal educational credential	Confidential	Confidential	1	6	1	3	3	8.77%	7
Crane and Tower Operators	537021	High school diploma or equivalent	180	40	9	0	0	3	3	18.55%	16
Hoist and Winch Operators	537041	No formal educational credential	50	Confidential	3	0	0	3	3	12.05%	12
Industrial Truck and Tractor Operators	537051	No formal educational credential	1,200	140	87	29	12	3	3	11.63%	133
Laborers and Freight, Stock, and Material Movers, Hand	537062	No formal educational credential	7,800	1,390	464	117	54	3	3	12.02%	1,417
Refuse and Recyclable Material Collectors	537081	No formal educational credential	590	120	9	3	2	3	3	11.01%	86
Tank Car, Truck, and Ship Loaders	537121	No formal educational credential	20	Confidential	5	1	0	3	3	1.30%	18
TOTAL			52,670	10,630	2,036	715	366				

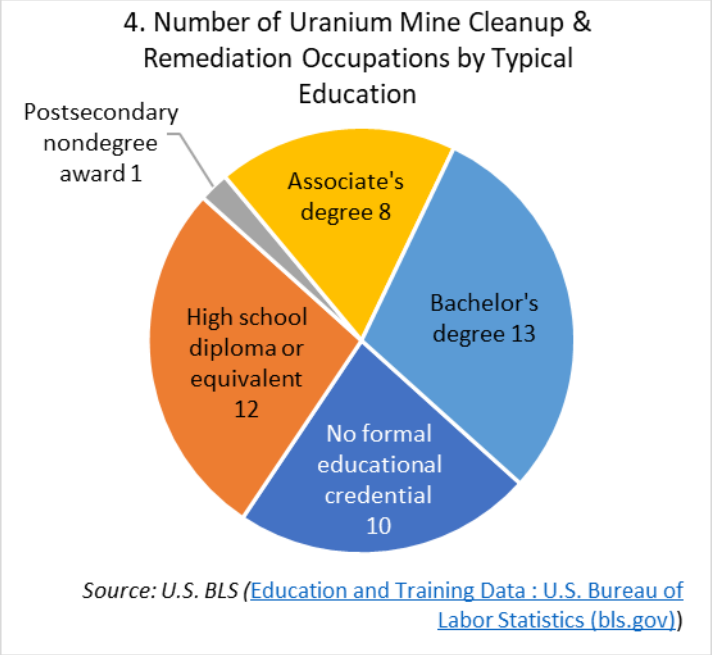
*Sources: 2018 Standard Occupational Classification system; U.S. Bureau of Labor Statistics Education and Training Assignments by Detailed Occupation (https://www.bls.gov/emp/tables/education-and-training-by-occupation.htm); OEWS survey; WCOS; NMDWS UI system; Workkeys (jobprofiles.act.org). *The Northern Workforce Region consists of Cibola, Colfax, Los Alamos, McKinley, Mora, Rio Arriba, San Juan, San Miguel, Santa Fe, and Taos. ** Bernalillo, Cibola, McKinley, Rio Arriba, San Juan, and Sandoval counties*

Uranium Mine Cleanup and Remediation Activities Occupations

A list of 44 occupations identified as related to uranium mine cleanup and remediation can be found in Exhibit 3. This list was gathered from the document *The Economic Opportunities and Challenges of Uranium Mine Cleanup in New Mexico*, prepared by the University of New Mexico Bureau of Business and Economic Research in Fall 2020.

The total current employment for these occupations in all industries is 52,670. One in five is currently employed in the Northern Workforce Region, which includes the counties of Cibola, Colfax, Los Alamos, McKinley, Mora, Rio Arriba, San Juan, San Miguel, Santa Fe, and Taos. The occupation with the highest employment in the state was heavy and tractor-trailer truck drivers (10,790), while the occupation with the highest employment in the Northern Workforce Region was construction laborers (1,930). Of all occupations with available data, tank car and truck loaders had the lowest employment in the state (20) while earth drillers and industrial engineering technologists and technicians had the lowest in the Northern Workforce Region (10 each). (Please note that these figures are for all industries, not just establishments in the Uranium mine cleanup and remediation industry.)

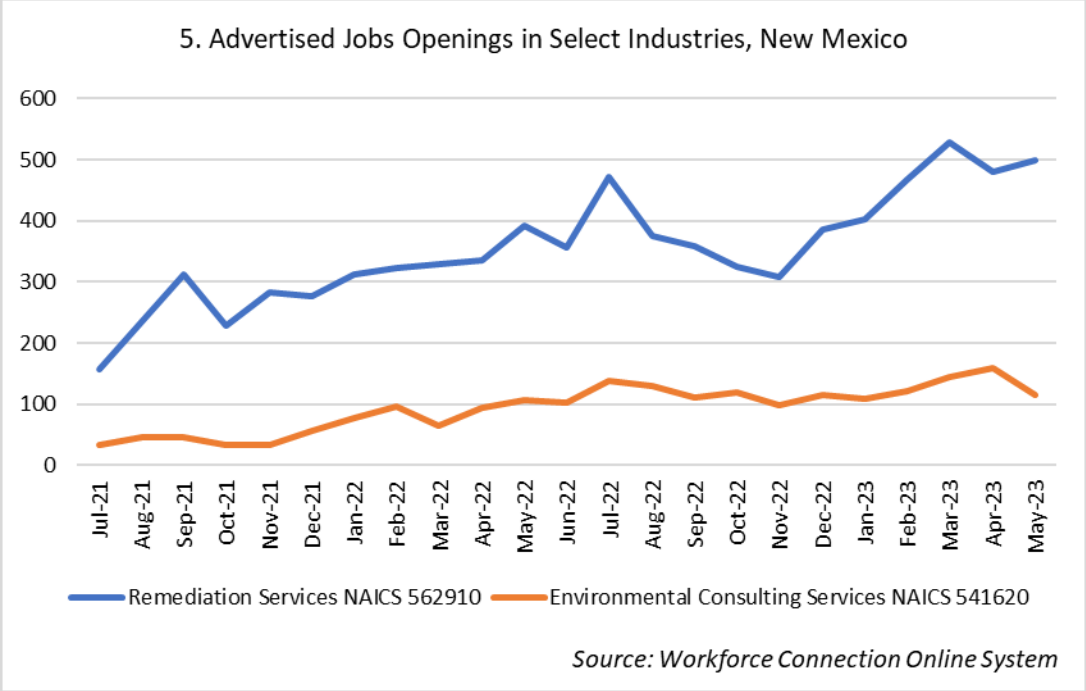
Exhibit 4 shows the number of uranium mine cleanup and remediation occupations by typical education level needed to enter the occupation. Twelve occupations need a high school diploma or equivalent, while 13 need a bachelor's degree. Only one, heavy and tractor-trailer truck drivers, needs a postsecondary nondegree award. Typical education needed by detailed occupation can be found in Exhibit 3.



*Source: U.S. BLS (*Education and Training Data : U.S. Bureau of Labor Statistics (bls.gov))

Advertised Job Openings

Exhibit 5 shows the number of advertised job openings available from the Department's Workforce Connection Online System (WCOS). In May 2023, the number of advertised job openings in New Mexico for the remediation services industry (NAICS 562910) was 500, while the number for environmental consulting services (NAICS 541620) was 114. The number of advertised job openings, or the demand for workers in these industries, have increased over time. The advertised job openings are collected from employer corporate sites, hospitals, non-profits, local and federal government agencies, schools and universities, recruiter sites, newspapers, volunteer sites, and other public, private, and state job boards. Data are spidered from different online job boards and are reviewed to eliminate duplication.



The total number of advertised job openings in uranium mine cleanup and remediation service occupations, in all industries, was over 2,000 in May 2023 (Exhibit 3). Laborers and freight, stock, and material movers had the most advertised job openings (464), followed by heavy and tractor-trailer truck drivers (459).

POTENTIAL SUPPLY OF LABOR

Current Unemployment

The data used in this section defines unemployed persons as those without jobs and actively seeking and available to work. Data on the unemployed are limited, but education level is available, which can then be mapped to the typical education needed to enter uranium mine cleanup and remediation occupations.

Exhibit 6 shows the educational attainment of unemployed New Mexicans 25 years and over. Data represent the 12-month average from May 2022 to April 2023. Slightly over one in three of the unemployed, or 8,900, had a high school diploma or equivalent. About 4,600, or 18.7 percent, had a Bachelor's degree or higher.

6. Number of Unemployed 25 Years and Over by Educational Attainment, April 2023, New Mexico		
	Unemployed	
Education Level	Number	Share
Less than a High school diploma	4,200	17.1%
High school diploma or equivalent	8,900	36.2%
Some college or associate degree	6,900	28.0%
Bachelor's degree and higher	4,600	18.7%
TOTAL	24,600	

Figures are 12-month moving averages. Source: U.S. Bureau of Labor Statistics, Current Population Survey. https://www.bls.gov/lau/notescps.htm

Characteristics of Claimants Receiving Unemployment Insurance Benefits

Not all unemployed workers apply for unemployment insurance (UI) benefits. Those who do provide the Department with additional information that can help identify the number of people able to do uranium mine cleanup and remediation work.[5]

During the week of May 14, 2023, 8,473 New Mexico claimants received UI benefits. Of those, 20 had previously worked in remediation services or environmental consulting services in a variety of occupations (Exhibit 7).

7. UI Claimants Separated from Remediation Services and Environmental Consulting Services Industries, by Occupation, Week of May 14, 2023	
Occupation	# Claimants
Anthropologists and Archeologists	1
Heating, Air Conditioning, Refrigeration Mechanics & Installers	1
Compliance Officers	1
Construction and Building Inspectors	1
Construction Laborers	2
Construction Managers	1
Cost Estimators	1
Hazardous Materials Removal Workers	3
Health & Safety Engineers, Except Mining Safety Engineers & Inspectors	1
Heavy and Tractor-Trailer Truck Drivers	1
Managers, All Others	2
Millwrights	1
Operating Engineers & Other Construction Equipment Operators	1
Project Management Specialists	1
Purchasing Agents	1
Soil and Plant Scientists	1
Source: NMDWS. Occupation data are self-reported and unverified.	

[5] UI claimants are considered a subset of the total number of unemployed but are gathered from different sources and are not necessarily comparable. For information on the differences between the unemployed and those receiving UI benefits, please see: Frequently Asked Questions (CPS) : U.S. Bureau of Labor Statistics (bls.gov).

As seen in Exhibit 3, 715 UI claimants in the state had worked in an occupation identified as being able to do uranium mine cleanup and remediation work. The occupation with the highest number of claimants was construction laborers (214), followed by heavy and tractor-trailer truck drivers (137). Seven occupations had no claimants; those were calibration technologist and technicians; geoscientists; hydrologists; hydrologic technicians; earth drillers, except oil and gas; crane and tower operators; and hoist and winch operators. (Please note that occupation data are self-reported and unverified by the Department.)

The number of claimants who lived in the counties of Bernalillo, Cibola, McKinley, Rio Arriba, San Juan, and Sandoval counties totaled 4,030, of which 366 worked in uranium mine cleanup and remediation occupations. The occupation that had the highest number of claimants was the same as statewide. There were 117 construction laborers and 78 heavy and tractor-trailer truck drivers receiving UI benefits living in those six targeted counties.

Education Completers

Another measure of the supply of workers is the number of higher education program completers. For the 2020–2021 school year, nearly 30,500 degrees and certificates of higher education were awarded by 46 New Mexico higher educational institutions tracked by the U.S. Department of Education.

Program completers, or the number of students who completed a postsecondary education program, are tracked by postsecondary field of study, or Classification of Instructional Programs (CIP) codes. There are 185 CIP codes that provide graduates with specific skills and knowledge thought to be successful in uranium mine cleanup and remediation occupations. There were 138 CIP codes that had no completers from New Mexico post-secondary education institutions, but 47 programs had a total number of 1,796 completers in the 2020–2021 school year (Exhibit 8). (A crosswalk of CIP codes and Uranium mine cleanup and remediation occupations can be found in the appendix.)

8. Completers from New Mexico Institutions, by Select CIP codes, 2020–2021		
CIP Code	**CIP Title**	**Number**
01.1106	Range Science and Management	14
03.0103	Environmental Studies	6
03.0104	Environmental Science	26
03.0201	Environmental/Natural Resources Mgmt. & Policy, General	2
03.0501	Forestry, General	8
03.0601	Wildlife, Fish and Wildlands Science and Management	47
14.0701	Chemical Engineering	120
14.0805	Water Resources Engineering	8
14.1401	Environmental/Environmental Health Engineering	11
14.2101	Mining and Mineral Engineering	12
14.2701	Systems Engineering	5
14.3501	Industrial Engineering	73
14.3801	Surveying Engineering	3
15.0001	Applied Engineering Technologies/Technicians	57
15.0404	Instrumentation Technology/Technician	58
15.0506	Water Quality & Wastewater Treatment Mgmt & Recycling Tech	12
15.0612	Industrial Technology/Technician	24
15.0701	Occupational Safety and Health Technology/Technician	16
15.0703	Industrial Safety Technology/Technician	2
15.1102	Surveying Technology/Surveying	1
15.1301	Drafting and Design Technology/Technician, General	15
15.1302	CAD/CADD Drafting and/or Design Technology/Technician	6
15.1501	Engineering/Industrial Management	10
26.0101	Biology/Biological Sciences, General	564
26.0204	Molecular Biology	2
26.0301	Botany/Plant Biology	1
26.0305	Plant Pathology/Phytopathology	9
26.0401	Cell/Cellular Biology and Histology	16
26.0503	Medical Microbiology and Bacteriology	15
26.0801	Genetics, General	12
26.1201	Biotechnology	20
26.1301	Ecology	2
30.3301	Sustainability Studies	8
30.4301	Geobiology	1
40.0501	Chemistry, General	67
40.0601	Geology/Earth Science, General	53
40.0602	Geochemistry	1
40.0603	Geophysics and Seismology	1
40.0604	Paleontology	3
40.0605	Hydrology and Water Resources Science	14
45.0701	Geography	39
45.0702	Geographic Information Science and Cartography	19
46.0201	Carpentry/Carpenter	25
46.0302	Electrician	79
46.0415	Building Construction Technology/Technician	17
46.0503	Plumbing Technology/Plumber	13
49.0205	Truck & Bus Driver/Commercial Vehicle Operator & Instructor	279
TOTAL		1,796
Source: IPEDS (Integrated Postsecondary Education Data System)		

WorkKeys

WorkKeys are a series of tests that assess and measure the skills needed in the workplace. It is administered by the Department on behalf of workers looking for a job or employers trying to assess potential applicants. Assessment results can then be compared to the minimum skill level needed to be successful in that occupation.

WorkKeys assessments were given to nearly 2,700 individuals between January 1, 2022 to April 11, 2023. Test takers included those who were unemployed, employed part time, and employed full time. The assessments that had the most test takers were applied math (2,480) and workplace documents (2,323).

The Applied Math assessment measures critical thinking, mathematical reasoning, and problem-solving techniques. The Workplace Documents assessment measures the skills needed to read work-related documents such as memos, letters, directions, signs, notices, bulletins, policies, and regulations.

The scores from these two assessments, along with the education level of the test taker, can be found in Exhibit 9. The minimum score needed to be successful in uranium mine cleanup and remediation occupations can be found in Exhibit 3. Although we do not know their program of study nor work history, over 90 percent of the test takers had the math and reading comprehension skills necessary to be successful in at least one environmental cleanup and reclamation job for their level of education attainment.

9. Count of Number of Test Takers, by Test, Education Level, and Score

Applied Math

	Score						TOTAL
Education Level	**0**	**3**	**4**	**5**	**6**	**7**	
None/I prefer not to respond/< HS	96	168	140	68	34	23	529
High school diploma or equivalent	104	288	424	309	137	71	1,333
Associate	8	25	50	78	47	29	237
Trade/Proprietary school certification	6	31	53	50	24	10	174
Bachelor's	6	15	34	40	36	44	175
Master's and higher	1	3	8	2	6	12	32
Grand Total	221	530	709	547	284	189	2,480

Workplace Documents

	Score						TOTAL
Education Level	**0**	**3**	**4**	**5**	**6**	**7**	
None/I prefer not to respond/< HS	101	118	185	67	35	11	517
High school diploma or equivalent	58	205	415	305	192	63	1,238
Associate	8	12	51	68	56	25	220
Trade/Proprietary school certification	3	8	51	44	35	11	152
Bachelor's	5	11	27	43	55	30	171
Master's and higher	-	2	3	5	5	10	25
Grand Total	175	356	732	532	378	150	2,323

Assessments were given between January 1, 2022 and April 11, 2023. Source: NMDWS & Workkeys

Employment Projections

Exhibit 10 shows the projected employment levels for the industries of professional, scientific, and technical services (NAICS 541) and waste management and remediation services (NAICS 562). Both industries are expected to have higher employment growth than the statewide average of 11.58 percent. Professional, scientific, and technical services is expected to grow by 11.96 percent to year 2030, or 7,201 jobs, while the industry of waste management and remediation is expected to grow 13.27 percent, or 462 jobs.

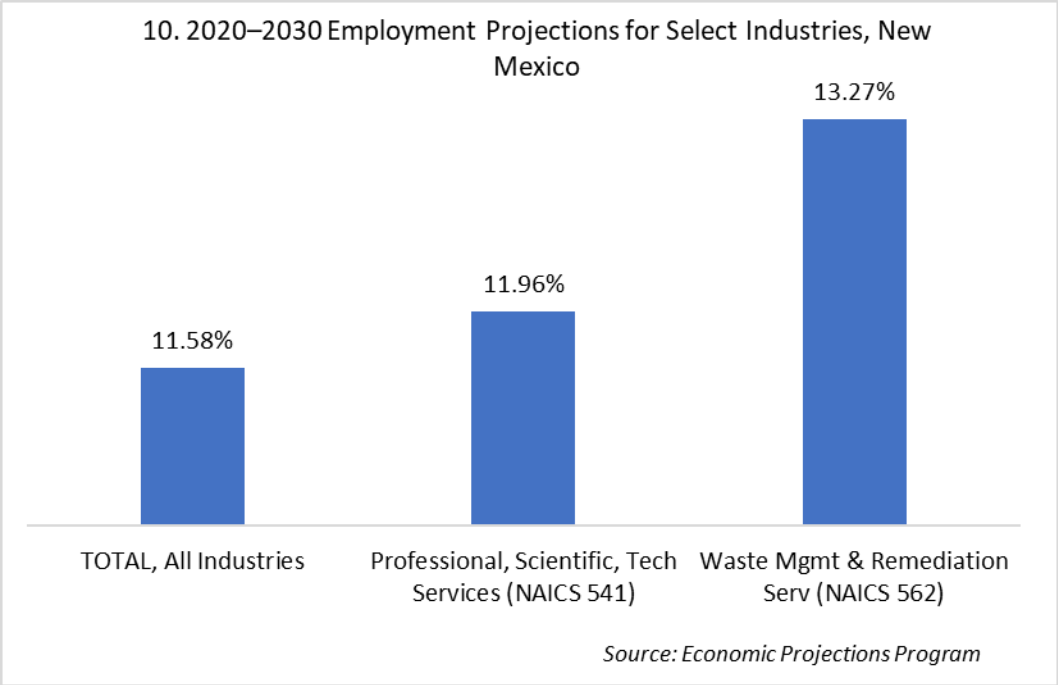


Exhibit 3 shows the projected growth to 2030 by occupation. The uranium mine cleanup and remediation cleanup occupation with the fastest growth is expected to occur for crane and tower operators (18.55 percent) and industrial engineers (15.17 percent). Projected annual job openings are highest for heavy and tractor-trailer truck drivers (1,510), laborers and freight, stock, and material movers (1,417), and construction laborers (1,413).

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Appendix E. Funding Opportunities Related to Workforce Development and Cleanup Activities

New Mexico Environment Department (NMED)
Uranium Mine Reclamation Strategic Planning Project
Task 6: Funding Opportunities

This document provides a framework for collecting data about potential funding opportunities which overlap with the goals and strategies of NMED's uranium reclamation efforts. The document includes funding topics, amounts, eligibilities, requirements, deadlines, and contact information.

***Disclaimer:** This research is drawn from web-based research conducted in 2023. While we strive to present the most accurate information possible, we cannot guarantee the accuracy and/or timeliness of the information shared on websites.*

Category	Description
General Funder Information	
Organization	Name of public or private funder
Funding Opportunity Name	Name of funding opportunity
Organization Type	Public or private funder
Website	Web URL for funding opportunity
Relevant Award Information	
Topics Addressed	Award's focal areas related to uranium reclamation efforts
Description	Brief description of the award opportunity
Award Amount	Range of award amount
Award Timeframe	Performance period of award
Eligibility	Applicant and project eligibility, if available
Cost Share Requirement	Cost share requirement, if applicable
Application Timeframe	Timeframe in which applications are released (e.g., rolling, annual)
Contact information	Name and email address/phone number, as available, for leadership at the funder institution or a relevant grants or program manager
Notes	Any further information that could affect the probability of funding, such as relevant news or developments, knowledge of future changes in funding priorities, or further information from website

Funding Opportunities

***Disclaimer:** This research is drawn from web-based research conducted in Summer 2023. While we strive to present the most accurate information possible, we cannot guarantee the accuracy and/or timeliness of the information shared on websites.*

General Funder Information				Relevant Award Information								
Organization	**Funding Opportunity**	**Organization Type**	**Website**	**Topics Addressed**	**Description**	**Award Amount**	**Award Timeframe**	**Eligibility**	**Cost Share Requirement**	**Application Timeframe**	**Contact information**	**Notes**
Department of Commerce (DOC): Economic Development Administration (EDA)	FY 2023 Public Works and Economic Adjustment Assistance (PWEAA) Programs	Public	https://www.eda.gov/funding/funding-opportunities/fiscal-year-2023-public-works-and-economic-adjustment-assistance	Workforce Development	Provides investments that support construction, non construction, planning, technical assistance, and revolving loan fund projects under EDA's Public Works program and EAA Program.	$100,000 - 2,500,000	1-5 years, project dependent	*Eligible applicants:* State governments; City or township governments; County governments; Nonprofits; Private institutions of higher education; Federally-recognized tribal governments; Public and State controlled institutions of higher education; Special district governments. *Eligible region:* Applicants must provide third-party data that clearly indicate that the relevant region is subject to one of the following economic distress criteria: (I) an unemployment rate that is, for the most recent 24-month period for which data are available, at least one percentage point greater than the national average unemployment rate; (ii) per capita income that is, for the most recent period for which data are available, 80 percent or less of the national average per capita income; or (iii) a "Special Need," as determined by EDA.	50%* *EDA may fund up to 80% of total project costs based on the relative needs of the region.	Rolling (Until the publication of a new PWEAA NOFO, cancellation of the current PWEAA NOFO, or all available funds have been expended)	Trisha Korbas, EDA Economic Development Representative Email: tkorbas@eda.gov Phone: (720) 626-1499	
Department of Commerce (DOC): Economic Development Administration (EDA)	STEM Talent Challenge	Public	https://www.eda.gov/funding/programs/stem-challenge	Workforce Development	Provides funding to create and implement innovative science, technology, engineering, and mathematics (STEM) work-based learning models (such as Registered Apprenticeships) that complement their respective region's innovation economy.	Up to $500,000	2 years, project dependent	*Eligible applicants:* State; Indian tribe; City or political subdivision of State; Entity whose application is supported by a State, political subdivision of a State, or a native organization that is a - nonprofit, institute of higher education, public-private partnership, science or research park, Federal laboratory, economic development organization or similar entity. A consortium of any of the aforementioned entities may apply.	50%	Annual	EDA Office of Innovation and Entrepreneurship Email: oie@eda.gov Phone: (202) 482-8001	
Department of Health and Human Services (HHS): National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC)	Occupational Safety and Health Education and Research Centers (T42)	Public	https://grants.nih.gov/grants/guide/rfa-files/RFA-OH23-003.html	Workforce Development	Provides funding for the development of Education and Research Centers (ERCs) that are focused on occupational safety and health training.	$1,300,000 - 1,800,000	3-5 years, project dependent	*Eligible applicants*: State governments; Nonprofits; County governments; City or township governments; Small businesses; Public housing authorities/Indian housing authorities; Private institutions of higher education; Public and State controlled institutions of higher education; Special district governments; Native American tribal governments; For profit organizations other than small businesses; Independent school districts.	None	Annual (Prospective deadlines: 10/21/2025, 10/26/2027)	General Grants Information Email: GrantsInfo@nih.gov Phone: 301-637-3015	ERCs are academic institutions that provide high-quality interdisciplinary graduate and post-graduate training, research training, continuing education, and outreach in the core occupational safety and health disciplines of industrial hygiene, occupational health nursing, occupational medicine, and occupational safety, as well as allied disciplines. ERCs serve as resources for our nation's workforce through continuing education, outreach and strong collaboration with professional associations, worker advocacy groups, businesses, industries, and public health agencies.
Department of Labor: Employment and Training Administration (ETA)	State Apprenticeship Expansion Formula (SAEF) Program	Public	https://www.dol.gov/sites/dolgov/files/ETA/grants/State%20Apprenticeship%20Expansion%20Formula_FOA-ETA-23-09.pdf	Workforce Development	Provides funding for States to support state capacity and state planning to create new and expand existing Registered Apprenticeship Programs (RAP) while also driving system innovation and reform.	Base Formula Funding: Up to $388,652 Competitive Funding: Up to $6,000,000	Base Formula Funding: 1 year Competitive Funding: 3 years	*Eligible applicants:* States - The Governor's Office must identify the State agency that will be the grant recipient (e.g., State Workforce Agency eligible for funding under Title I of the Workforce Innovation and Opportunity Act (WIOA), State Educational Agency, or an SAA). This entity will have sole responsibility for administering the project and will serve as the grant's fiscal agent. For States with federally recognized SAAs and where the SAA is not the State agency that will be the grant recipient, the SAA must be included as a partner. Each State is limited to one individual application for consideration under this opportunity. *Eligible participants:* Persons 16 years of age and older.	None	Annual, subject to available funds	Matthew Carls, Grants Management Specialist Email: SAEF_FOA-ETA-23-09@dol.gov	DOT has a variety of workforce development funding opportunities released annually including youth career development and workforce pathway grants. Opportunities can be viewed using the following link: https://www.dol.gov/agencies/eta/grants/apply/find-opportunities

Organization	Funding Opportunity	Organization Type	Website	Topics Addressed	Description	Award Amount	Award Timeframe	Eligibility	Cost Share Requirement	Application Timeframe	Contact information	Notes
Department of Transportation (DOT): Pipeline and Hazardous Materials Safety Administration	Hazardous Materials State Inspection (HMSI) Grant	Public	https://www.highergov.com/document/hmsi-fy-2023-nofo-updated-6-6-23-pdf-329330/	Hazardous Waste Management, Workforce Development	Provides funding to carry out state-based inspections of hazmat shippers to increase compliance and ensure the safe transport of hazardous materials.	$100,000 - 1,000,000	1-2 years	*Eligible applicants:* State agencies who have the authority and capability to perform hazardous materials shipper inspections in accordance with the HMR and within the Hazardous Materials Transportation Investigator/Inspector Uniform Training Performance Standards. *Eligible activities:* Hazmat shipper inspection cost; Hazmat inspection equipment and supplies; Hazmat inspector training.	None	Annual	Dwayne Cross, Agreement Administrator Email: Dwayne.Cross@dot.gov Phone: (202) 366-4429 Carla Sheppard, Program Contact Email: Carla.Sheppard@dot.gov Phone: (202) 366-1109	DOT's Hazardous Materials Grant Program includes other grant opportunities. State governments are also eligible for the following grant under this program: Hazardous Materials Emergency Preparedness. https://www.phmsa.dot.gov/about-phmsa/working-phmsa/grants/hazmat/hazardous-materials-grants-program
Environmental Protection Agency (EPA)	Brownfields Multipurpose, Assessment, Revolving Loan Fund, and Cleanup (MARC) Grant	Public	https://www.epa.gov/brownfields/multipurpose-assessment-rlf-and-cleanup-marc-grant-application-resources	Reclamation	Provides funding to carry out a range of eligible assessment and cleanup activities, including planning and additional community engagement activities. Funding must be used to conduct both assessment and cleanup activities.	FY23: Up to $800,000	*Information not available*	*Eligible applicants:* General Purpose Unit of Local Government; Land Clearance Authority or another quasi-governmental entity that operates under the supervision and control of, or as an agent of, a general purpose unit of local government; Government entity created by State Legislature; Regional Council or group of General Purpose Units; State; Redevelopment Agency; Indian tribe; Nonprofits; Limited liability corporations in which all managing members are 501(c)(3) nonprofit organizations.	None	Annual	Paul Johnson, EPA R6 Email: Johnson.Paul@epa.gov Phone: (214) 665-2246	There are stipulations for funding uranium cleanup: it must have a defined reuse purpose and must not be a superfund site, and the state cannot apply for the grant - the state provides support.
Environmental Protection Agency (EPA)	Brownfields Job Training (JT) Grants	Public	https://www.epa.gov/brownfields/fy-2024-brownfields-job-training-jt-grants	Hazardous Waste Management, Workforce Development	Provides funding to deliver Brownfields Job Training (JT) programs that recruit, train, and place local, unemployed and under-employed residents with the skills needed to secure full-time employment in the environmental field. Promotes the facilitation of activities related to assessment, cleanup, or preparation of contaminated sites, including brownfields, for reuse, while simultaneously building a local workforce with the skills needed to perform remediation work that is supportive of environmental protection and environmental health and safety.	Up to $500,000	5 years	*Eligible applicants:* State; Government entity created by State Legislature; General Purpose Unit of Local Government; Land Clearance Authority or other quasi-governmental entity that operates under the supervision and control of, or as an agent of, a general purpose unit of local government; Regional Council or group of General Purpose Units of Local Government; Redevelopment Agency; Indian Tribe; Nonprofits. *Eligible activities:* Direct programmatic costs associated with implementing a Brownfields Job Training program.	None	Annual	Matt Wosje, EPA Headquarters Contact Email: Wosje.Matthew@epa.gov Phone: (202) 566-1060 Emily Jimenez, EPA Region 6 Contact Email: jimenez.emily@epa.gov Phone: (214) 665-2176 Rita Ware, EPA Region 6 Contact Email: ware.rita@epa.gov Phone: (214) 665-6409	EPA's Brownfields Program has various funding opportunities available annually. As of the time of this research, the only solicitation open is the JT grant. Additional EPA Brownfields funding opportunities including assessment grants, revolving loan fund grants, cleanup grants, and state and tribal response program grants.
Environmental Protection Agency (EPA)	Environmental Justice Government to Government Program	Public	https://www.epa.gov/environmentaljustice/environmental-justice-government-government-program#eligible	Reclamation Workforce Development	Provides funding at the state, local, territorial, and tribal level to support government activities that lead to measurable environmental or public health impacts in communities disproportionately burdened by environmental harms. The EJG2G program goals are to: Achieve measurable and meaningful environmental and/or public health results in communities; build broad and robust, results-oriented partnerships, particularly with community-based nonprofit organizations (CBO) within disproportionately impacted areas; pilot activities in specific communities that create transferable models, which can be expanded or replicated in other geographic areas and; strengthen the development and implementation of meaningful approaches to achieve environmental justice.	Up to $1,000,000	3 years	*Eligible applicants:* A state in partnership with a community-based nonprofit organization; A Tribe in partnership with a community-based nonprofit organization; A local government in partnership with a community-based nonprofit organization US Territories, Freely Associated States, and tribal governments in remote areas. *Eligible activities* Eligible project categories: Community-led air and other pollution monitoring, prevention, and remediation, and investments in low- and zero-emission and resilient technologies and related infrastructure and workforce development that help reduce greenhouse gas emissions and other air pollutants; mitigating climate and health risks from urban heat islands, extreme heat, wood heater emissions, and wildfire events; climate resiliency and adaptation; or reducing indoor toxics and indoor air pollution. Eligible project activities: research that is incidental to the project design; public education; small-scale construction and demolition work (if needed for project); small-scale clean-ups; installations of air or water filtration systems; major disposal training; energy recovery projects training; building refurbishments that reduce greenhouse gas emissions and other pollutants; mitigation of pollution; remediation of lead or asbestos; workforce development to support low and zero emission and resilient technologies that reduce greenhouse gas and other air pollutants; Environmental Justice partnership building that engages disadvantaged communities in Local, State and Federal public processes, such as advisory groups, workshops, and rulemakings; community revitalization planning in support of climate resiliency and adaptation; monitoring of sources of pollution; efforts to improve equitable transportation and mobility including through efforts to address barriers of cost and safety related to walking, bicycling, and public transit in order to reduce air pollution; development of disaster preparedness plans ; community revitalization planning addressing local pollution and greenspace; facilitating the engagement of disadvantaged communities in State advisory groups, workshops and rulemakings and other public processes; Smaller scale land purchases and/or acquisitions NOTE – only land purchases and/or acquisitions which represent less than half of the requested project funds under an application are allowable.	None	Annual	Omari Burrell, Office of Environmental Justice and External Civil Rights Burrell.Omari@epa.gov Jacob Burney, Office of Environmental Justice and External Civil Rights burney.jacob@epa.gov Gerardo Acosta, EPA R6 Acosta.Gerardo@epa.gov	Formerly named the State Environmental Justice Cooperative Agreement (SEJCA) Program. Could provide funding for AUM cleanup in EJ communities. Awards are in the form of cooperative agreements.

Organization	Funding Opportunity	Organization Type	Website	Topics Addressed	Description	Award Amount	Award Timeframe	Eligibility	Cost Share Requirement	Application Timeframe	Contact information	Notes
Environmental Protection Agency (EPA) / New Mexico Environment Department (NMED)	Clean Water State Revolving Fund (CWSRF)	Public	https://www.epa.gov/cwsrf	Reclamation	A federal-state partnership that provides low-cost financing to communities for a wide range of water quality infrastructure projects, including municipal wastewater facilities, nonpoint source pollution control, decentralized wastewater treatment systems, stormwater runoff mitigation, green infrastructure, estuary protection, and water reuse. NMED's Construction Programs Bureau manages the EPA SWSRF. Funding is available for Planning Loans, Design Loans and Construction Loans.	CWSRF loans are offered at low interest rates of 0% to 1% for public entities and 2.375% for private entities. Loan repayment terms may be up to 30 years.	*Information not available*	*Eligible borrowers:* Municipalities; Counties; Water and Sanitation Districts; Mutual Domestic Water Associations; Pueblos and Tribes; Private entities are eligible for limited types of projects. *Eligible programs:* Publicly owned centralized wastewater treatment works construction, repair or replacement; Implementation of a non-point source management plan; Decentralized systems treating municipal or domestic sewage; Measures reducing, treating, or managing stormwater; Measures reducing demand to publicly owned treatment works through conservation; Watershed projects; Reducing energy consumption at publicly owned treatment works; Projects for reusing or recycling wastewater or stormwater; Increasing security at publicly owned treatment works.	Not applicable	Rolling, year-round	Rhonda Holderman, NMED Construction Programs Bureau	The CPD has primarily used it for water treatment, waste water and solid waste projects for counties and municipalities in NM. Some storm water projects have also been financed by the CWSRF. The CPD has never used this fund for any private individuals due to the increased risk of default or issues with reimbursement.
National Science Foundation	Advancing Informal STEM Learning (AISL) Program	Public	https://www.nsf.gov/pubs/2022/nsf22626/nsf22626.htm	Workforce Development	Provides funding to advance informal STEM learning experiences and environments. The current solicitation encourages proposals from institutions and organizations that serve public audiences, and specifically focus on public engagement with and understanding of STEM.	$150,000 - 3,500,000	1-5 years, project dependent	*Eligible Applicants:* Categories of eligible applicants are identified in the NSF Proposal & Award Policies & Procedures Guide (PAPPG), Chapter I.E, which states: "The following organizations are eligible to submit proposals: Institutions of Higher Education, Nonprofits, Tribal Governments. The following organizations may be eligible to submit proposals: For-profits, State and Local Governments (as programmatically necessary)" (pg. I-5). https://nsf-gov-resources.nsf.gov/2022-10/nsf23_1.pdf	None	Annual	Email: DRLAISL@nsf.gov Phone: (703) 292-8616	
The McCune Charitable Fou	Economic Development & Family Asset Building Priority Area	Private	https://nmmccune.org/grant-eligibility/#foundation-priorities	Workforce Development	A Foundation priority is to create and expand the economic base in New Mexico, particular supporting programs and organizations that seek to foster entrepreneurship across sectors.	General Operating Support Grants: $10,000 - 100,000 Discretionary Grants: $1,000 - 5,000	1 year	*Eligible applicants:* Governments; Nonprofits; Federally-recognized tribes; Public schools.	*Information not found*	General Operating Support Grants: Annual, generally mid-August to mid-September. *Starting in 2024, the Foundation will begin phasing in multi-year grants in the Focus Grant category.* Discretionary Grants:	Email: grants@nmmccune.org Phone: (505) 983-8300	
The Mott Foundation	Education Priority Area	Private	https://www.mott.org/work/education/	Workforce Development	A Foundation priority is education, providing grants to help youth develop the knowledge and skills to succeed in college and career pathways. For example, objectives for the Afterschool Youth Entrepreneurship Initiative include to: 1) expand opportunities for young people to learn about and experience entrepreneurship in existing afterschool, STEM and summer learning programs; 2) connect with local, regional and state entrepreneurship organizations to help integrate entrepreneurship into afterschool and summer learning programs; and 3) partner with organizations such as chambers of commerce, businesses, career technical education and higher education to expand successful entrepreneurship models in communities of high need.	*Information not available*	*Information not available*	*Information not available*	*Information not available*	*Information not available*	Headquarters phone: (810) -238 5651 Submit a letter of inquiry form using the following link: https://www.mott.org/letter-of-inquiry/	The following link provides a list of grants the foundation has provided in New Mexico: https://www.mott.org/grants/?location=New+Mexico