

Abandoned Uranium Mines Working Group Addressing Health and Safety Risks of Abandoned Uranium Mines Multiagency Strategic Plan

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The Abandoned Uranium Mines Working Group (AUMWG) is a consortium of federal agencies working together to address the human health, safety, and environmental challenges posed by the nation's approximately 4225 abandoned mines resulting from legacy defense-related uranium mining. By marshalling and leveraging the resources of multiple federal agencies, the group works with states and tribes to identify and address high-priority mines in an effective and coordinated manner.

Purpose

This document is a collaborative effort between the U.S. Department of Energy (DOE), the U.S. Department of the Interior (DOI), the U.S. Bureau of Land Management (BLM), the U.S. Bureau of Indian Affairs (BIA), the National Park Service (NPS), the U.S. Department of Agriculture (USDA), the U.S. Forest Service (USFS), and the U.S. Environmental Protection Agency (EPA) to develop a comprehensive multiagency strategy to address the human health, safety, and environmental risks posed by defense-related abandoned uranium mines (AUMs).

This plan summarizes the scope of the problem; provides existing information on the costs of cleanup; describes the authorities and roles in addressing the human health, environmental, and physical hazards associated with these mines; and presents a coordinated federal agency strategy to work together and along with state and tribal partners to address AUMs. This document does not address other types of hardrock mining sites.

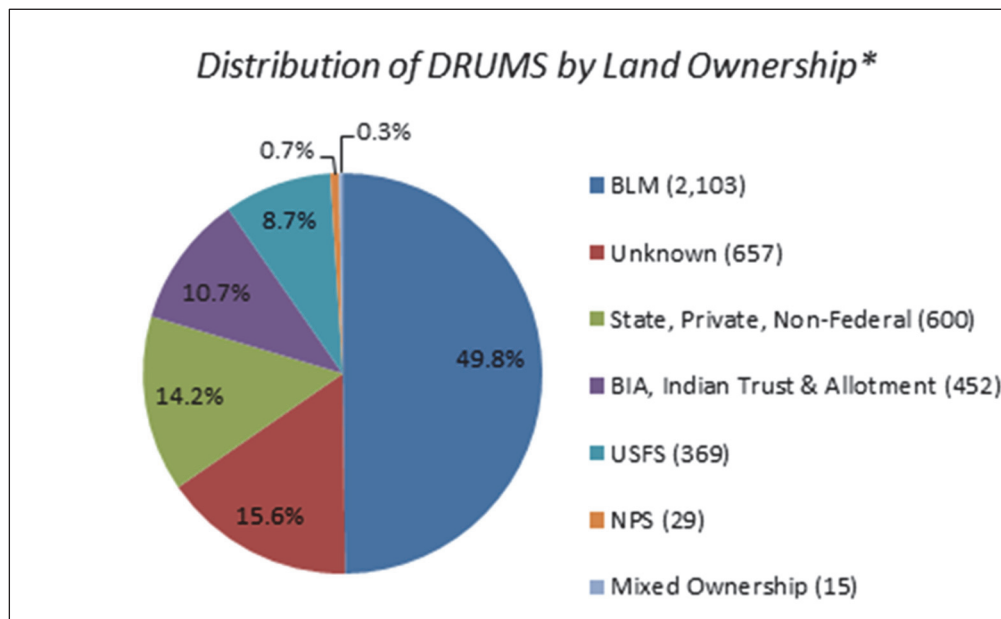
Problem Statement

The August 2014 *Defense-Related Uranium Mines Report to Congress* (DOE 2014b) (Report to Congress) prepared by DOE identified 4225 mines from which the U.S. Atomic Energy Commission purchased ore. Most of these mines are abandoned.¹ The Defense-Related Uranium Mines (DRUM) Report to Congress concluded that there are numerous data gaps associated with AUMs. Most importantly, the extent of the human health, environmental, and physical safety risks; other public health and safety threats; and environmental degradation associated with the mines need to be accurately determined.

¹ An abandoned mine is one where development, mining, and other operations ceased with no evidence to demonstrate that the operator intended to resume mining. Some abandoned mines may have viable responsible parties; other abandoned mines are without viable responsible parties. For purposes of this effort, the members of this latter group are referred to as "orphan sites."

The DRUM Report to Congress says that over 90% of these mines are in the five states of Arizona, Colorado, New Mexico, Utah, and Wyoming. Most of the sites (over 65%) are small and small/medium mines, each having produced 1000 tons of ore or less. Nearly 60% of all the mines are on federal public land managed by BLM and USFS. BLM estimates that 50% of mines on public land will likely require site inspections to identify and evaluate threats to human health and safety and the environment as well as to determine if response actions are warranted.

The DRUM Report to Congress also concluded that 11% of DRUM mines are on tribal land and that the majority of these are on the Navajo Nation. The radiological risks associated with mine waste from AUMs are not immediately evident. As a result, mine waste material had been used in the construction of some homes, and in other cases, homes have been built directly on top of mine waste. To date, over 50 homes on the Navajo Nation have been remediated or replaced due to radiological contamination.



*The data are from DOE's *Defense-Related Uranium Mines Prioritization Topic Report* (DOE 2014a). These figures do not include mines that began operating after 1970.

The DRUM Report to Congress also found that most uranium mine production was from very large mines (those that produced over 500,000 tons of ore) in New Mexico, including mines on the Navajo Nation as well as Laguna Pueblo land. Of the 75.9 million tons of uranium ore produced for defense-related purposes, New Mexico mines led in production with over 52 million tons, exceeding the ore produced in Colorado, Utah, and Wyoming combined.

While many abandoned mines include physical hazards such as open shafts and pits, mines on private property and tribal land typically pose a higher threat from radiological exposure, since residents can build homes on or near abandoned mines without being aware of the risk. In these cases, the incremental lifetime cancer risk, as estimated by DOE and EPA, can be 1000 times higher than the maximum level of risk considered acceptable by EPA for site cleanups under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In contrast, according to the DRUM Report to Congress, chemical and radiological risks are typically lower at sites where recreational risk scenarios are more typical; the risk of exposure to chemical and radiological hazards at these sites is estimated to be 1 in 10,000. In some cases, mines on tribal, private, and public land can also impact important ecological resources, such as wetlands.

Some of the highest-risk mines are on tribal lands and other areas where poverty, linguistic isolation, limited access to education, and other factors contribute to increased vulnerability to pollution. Many of these areas can be easily identified using EPA's Environmental Justice Screening and Mapping Tool, EJScreen, at <https://www.epa.gov/ejscreen>. The government's response to the AUM problem within the Navajo Nation has received attention from several members of Congress, the U.S. Government Accountability Office (GAO), and national and local press outlets, such as the *New York Times*, the *Los Angeles Times*, and KZMU-FM Moab Community Radio.

EPA, DOE, DOI, and USDA have used existing authorities and funding to address some of the worst problems associated with these AUMs. Although there is no comprehensive federal program, these agencies are using their authority to inventory, assess, clean up and conduct long-term monitoring and maintenance of AUMs.

Cleanup Costs

The costs for mine assessment, reclamation, and remediation vary significantly. Although costs for individual mines cannot be estimated without site-specific data, the DRUM Report to Congress estimated reclamation and remediation costs by the production size category of the mines. Reclamation typically involves mitigating the physical safety hazards by closing vertical shafts and horizontal adits and stabilizing as well as covering waste rock piles. Remediation often involves removing or stabilizing and covering waste rock piles and addressing surrounding soils that exceed radiological or chemical cleanup levels. If the waste rock and soil material is removed, it is placed in an onsite or offsite repository. In the DRUM Report to Congress, it was concluded that an unknown (but likely to be limited) number of mines have impacted surface water or groundwater. Where this has occurred, it significantly increases cleanup costs. Remediation cost estimates generally include many activities that would also take place in reclamation actions; therefore, the costs of these two actions should not be added together.

EPA estimates that it may cost approximately \$2 billion to \$5 billion for the reclamation and remediation of AUMs based on the cost estimates from the DRUM Report to Congress shown below. The costs for 37 “very large” mines in the United States were not addressed in the DRUM Report to Congress because costs vary widely. Some level of reclamation or remediation work has begun at several of these mines. Other costs associated with mine reclamation and remediation can be from long-term monitoring and maintenance costs, if needed. However, the large cost range for reclamation and remediation of all mines reflects the fact that preliminary inventory and assessment data (e.g., number of waste piles, levels of gamma radiation) have not been collected for many sites.

Reclamation and Remediation Costs for Defense-Related Uranium Mines^a

Tons of Ore Produced	Mine Production Size Category	Range of Reclamation Costs	Range of Remediation Costs^b
0–100	Small	\$10,000–\$70,000	\$10,000–\$80,000
100–1,000	Small/medium	\$10,000–\$80,000	\$20,000–\$100,000
1,000–10,000	Medium	\$50,000–\$250,000	\$110,000–\$840,000
10,000–100,000	Medium/large	\$270,000–\$730,000	\$2,500,000–\$6,500,000
100,000–500,000	Large	\$560,000–\$1,400,000	\$4,900,000–\$15,400,000
>500,000	Very large	Not estimated	Not estimated

Notes:

^a The data are from the Report to Congress (DOE 2014).

^b The “Range of Remediation Costs” does not include long-term water treatment costs and may be understated.

GAO estimates that it would take EPA about 105 years to fund removal actions at 21 of the highest priority Navajo Nation mines without potentially responsible parties (PRPs) under CERCLA, if current funding levels continued (see *Uranium Contamination Overall Scope, Time Frame and Cost Information is Needed for Contamination Cleanup on the Navajo Reservation* [GAO 2014]).

Federal Agency Authorities, Funding, and Roles

Responsibility for inventory, assessment, investigation, and cleanup of mines varies depending on location, legal authority, funding source, implementing agency, and regulatory approach. Some potential approaches are outlined in the table below.

Agency, Authority, and Funding by Mine Location

Mine Location	Authority to Conduct Work	Funding Source	Lead Agency	Support Agency ^{a,b}
Federal land	CERCLA Federal Land Policy and Management Act National Forest Management Act Surface Resources Act	Appropriations to federal agencies; PRPs and settlements	Land management agencies (BLM, USFS, and NPS)	States, DOE
Tribal land	CERCLA	Appropriation to EPA; PRPs and settlements	EPA	Tribes, BIA, DOE
State and private land	CERCLA	Appropriation to EPA; PRPs and settlements	EPA	States, DOE

Notes:

^a “Support Agencies” are agencies, in addition to the lead agency, that provide or receive resources involved in cleanup or assessment work.

^b DOI, through the Surface Mining Control and Reclamation Act of 1977, provides funding to states for their abandoned mine lands programs; this is a source of funding to address physical safety hazards on federal and state land and private property.

Strategy

In fiscal year (FY) 2015, following their collaboration with DOE to prepare the DRUM Report to Congress, representatives from EPA, DOE, BLM, and USFS formed the AUMWG to develop a coordinated approach to the assessment and cleanup of AUMs. The approach was to use existing authorities and agreements to implement a multiyear program to inventory, assess, investigate, prioritize, and clean up AUMs that pose a high risk to human health, safety, or the environment. It builds upon successful interagency models used in the Grants Mining District of New Mexico and the Navajo Nation. Each agency will engage in tribal consultation as appropriate. Each agency may also choose to seek an appropriation based upon its share of the AUMs.

The following is a brief description of each agency’s role in addressing the mines within its jurisdiction. This one-government approach optimizes the benefit to the government by leveraging resources to expedite the reduction of risk to human health, safety, and the environment. In all instances, where a PRP can be found, agencies would follow the CERCLA process to require response actions by that party.

EPA will continue efforts to execute enforceable agreements with PRPs for mine cleanup, implement the Tronox Inc. settlement, oversee trust settlements, and conduct fund-lead response actions, such as the replacement of contaminated homes as well as assessments of high-priority mines near homes. A major focus of EPA’s efforts will continue to be on investigations and response actions in the San Mateo Creek Basin of the Grants Mining District mines on or near the Navajo Nation and collaboration with the DRUM Program.

DOE will continue to maintain the existing DRUM Program database and add information collected by all federal agencies so that the database continues to improve in completeness and accuracy. These data will ultimately be transferred to the partner agencies. The data will also assist BLM and USFS, through existing agreements, in performing AUM site inventory and assessment on public land, as well as establishing agreements with EPA for work on state and tribal land and private property. This work will (1) help to add more information to the DRUM Program database, (2) help to further establish the locations of some mines (including mines whose land ownership was uncertain when the DRUM Report to Congress was published), and (3) provide information that BLM and USFS will use to determine if a mine requires reclamation or remediation and what level of priority it should be given.

DOE will have substantially completed DRUM Program Campaign 1, which involves the inventory of mines on public land, by March 31, 2024. With interagency collaboration, DOE initiated Campaign 2, which involves the inventory and assessment of mines on tribal land, in FY 2022. Once Campaign 1 is substantially complete, DOE will initiate Campaign 3, which involves the inventory and assessment of mines on private property. In FY 2023, DOE will continue working with partner land management agencies on the reclamation of physical safety hazards which represent an immediate threat to human health and safety.

BLM will continue the assessment and cleanup of DRUM sites. The rate of progress of work at those sites is constrained by available funding. BLM currently leverages program funding, existing agreements, and available federal funding with states to continue its response actions at the mine sites it has already identified. Additional funding would specifically allow BLM to complete preliminary assessments and site inspections of AUMs on public land. BLM will continue to partner with DOE so that the resources of both agencies can be leveraged to collectively perform DRUM Program inventory work on BLM-managed land.

USFS will continue the assessment and cleanup of AUMs to a degree commensurate with annual funding and the consideration of other priority projects. Additional funding would permit USFS to conduct a complete AUM inventory and evaluate these sites for potential releases to the environment. USFS is partnering with EPA regions, as well as states and DOE, to leverage agency resources and collectively address AUMs on USFS-managed land.

As a trustee for tribal mine sites, BIA will participate in community outreach efforts, ensuring that tribes are informed and consulted both formally and informally. BIA may monitor the ongoing work at tribal mine sites and provide long-term monitoring of institutional controls and completed remedies applied to tribal lands.

NPS is investigating the nature and extent of contamination at the Orphan mine site, which is on and below the South Rim in the Grand Canyon National Park, using its CERCLA authority. NPS intends to identify a recommended cleanup action for the upper mine area in the near term and address the lower mine area in the future, as they are generally inaccessible to park visitors.

Ultimately, the agencies propose implementing a coordinated multiyear program to inventory, prioritize, assess, and clean up AUMs that pose a high risk to human health, safety, or the environment. The AUMWG Strategic Plan will be reviewed by the participating agencies annually and revised as appropriate.

Nothing in this strategy is intended to supersede existing authorities, agency guidance, or policies or to impact the current process of identifying PRPs and initiating CERCLA removal actions.

Communication and Coordination

Internal

The AUMWG recognizes the need for general communication and coordination guidelines to maintain open and transparent lines of communication and ensure that the team functions and performs as effectively as possible. The working group will adhere to the following general guidelines:

- The AUMWG will serve as the umbrella organization for the communication of general AUM and DRUM issues.
- The positions of the AUMWG shall be the result of discussion and agreement among the AUMWG members and shall have the approval of the appropriate management of the agencies involved.
- The AUMWG will uphold an environment of open and transparent dialogue by:
 - ❖ Following general meeting practices.
 - ❖ Bringing any issues or opportunities to the group for discussion early.
- The AUMWG will, in general, be staffed by agency or department headquarters, regional, and field representatives who will be responsible for communicating and coordinating with their respective senior-level managers and regional or state-level counterparts.
- The AUMWG will hold quarterly conference calls to provide and discuss updates and course corrections, lessons learned, and best practices. Calls may be rescheduled or canceled as needed by the group.
- The AUMWG will convene annually (face-to-face or by video teleconference) for purposes of planning, general coordination, and issue identification.
 - ❖ One goal of the annual meeting is for the agencies to share their respective priorities with each other and, to the extent possible, find opportunities to leverage interagency efforts
 - ❖ A second goal of the annual meeting is to identify joint priority projects and develop milestones, identify agency responsibilities, and seek management commitment for each joint project

- The AUMWG will work electronically in a shared workspace (e.g., DOI's SharePoint webpage).
- The AUMWG will invite industry, states, and tribes to participate as appropriate.

External

Important to the success of the AUMWG is effective communication and coordination with external partners and stakeholders. These include states, tribes, industry, Congress, the U.S. Office of Management and Budget, and others. The AUMWG will conduct an annual review of its communications strategy and will update it as necessary to (1) ensure that it remains centered on sharing the AUM approach to build awareness of the effort and its progress, (2) collect additional input and ideas, and (3) generate interest in participating in and advancing the AUM effort.

References

DOE (U.S. Department of Energy), 2014a. *Defense-Related Uranium Mines Prioritization Topic Report*, LMS/S10797, Office of Legacy Management, June.

DOE (U.S. Department of Energy), 2014b. *Defense-Related Uranium Mines Report to Congress*, U.S. Department of Energy, August.

GAO (U.S. Government Accountability Office), 2014. *Uranium Contamination Overall Scope, Time Frame and Cost Information is Needed for Contamination Cleanup on the Navajo Reservation*, GAO-14-323, Report to Congressional Requesters, May.