



Report to the Ranking Member,
Subcommittee on Interior, Environment,
and Related Agencies,
Committee on Appropriations,
U.S. Senate

March 2020

ABANDONED HARDROCK MINES

Information on Number of Mines, Expenditures, and Factors That Limit Efforts to Address Hazards

Accessible Version

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Highlights of [GAO-20-238](#), a report to the Ranking Member of the Subcommittee on Interior, Environment, and Related Agencies, Committee on Appropriations, U.S. Senate

Why GAO Did This Study

The General Mining Act of 1872 allowed individuals to obtain exclusive rights to valuable hardrock mineral deposits on land belonging to the United States. Miners explored, mined, and processed valuable minerals, but many did not reclaim the land after their operations ended. Unsecured mine tunnels, toxic waste piles, and other hazards—known as mine features—are found at abandoned hardrock mines across federal and nonfederal lands. The Forest Service, BLM, National Park Service, EPA, and OSMRE—as well as state agencies—administer programs that identify and address hazardous features at abandoned hardrock mines. Addressing features could include, for example, sealing mine tunnels or treating contaminated water.

GAO was asked to provide information about abandoned hardrock mines. This report describes (1) what is known about the number of abandoned hardrock mines in the United States; (2) agency spending to address abandoned hardrock mines from fiscal years 2008 through 2017 and estimated future costs; and (3) factors that limit federal and state agencies' and stakeholders' efforts to address abandoned mines.

GAO obtained and summarized information from agency databases about the number of abandoned mines, features, and hazards as of 2019; summarized agency spending data from fiscal years 2008 through 2017, the most currently available; and interviewed federal and state agency officials and stakeholders, selected to provide diverse perspectives.

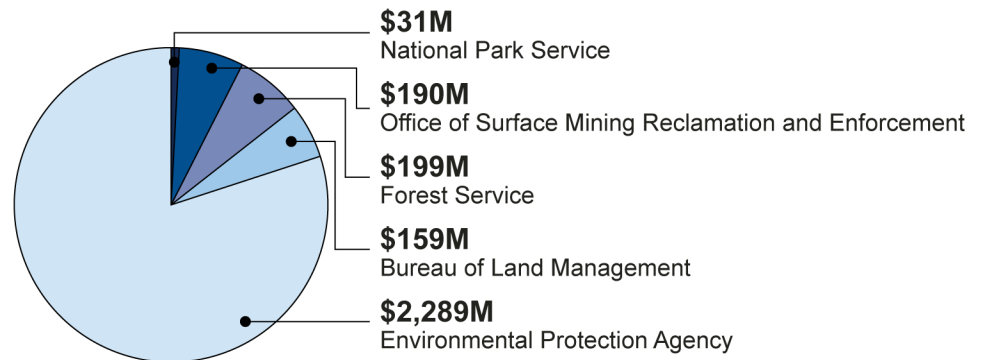
View [GAO-20-238](#). For more information, contact Anne-Marie Fennell at (202) 512-3841 or fennella@gao.gov.

What GAO Found

The U.S. Department of Agriculture's Forest Service, the Department of the Interior's Bureau of Land Management (BLM) and National Park Service, and the Environmental Protection Agency (EPA) identified at least 140,000 abandoned hardrock mine features, such as a tunnel, on lands under their jurisdictions. Of these, about 67,000 pose or may pose physical safety hazards—danger of injury or death—and about 22,500 pose or may pose environmental hazards—risks to human health or wildlife from long-term exposure to harmful substances. Agency officials also estimated there could be more than 390,000 abandoned hardrock mine features on federal land they have not captured in their databases, and agencies are developing more comprehensive information about these mines.

Forest Service, BLM, National Park Service, EPA, and Interior's Office of Surface Mining Reclamation and Enforcement (OSMRE) spent, on average, about \$287 million annually to address physical safety and environmental hazards at abandoned hardrock mines from fiscal years 2008 through 2017, for a total of about \$2.9 billion (see figure). Of this total, the agencies spent about 88 percent (\$2.5 billion) addressing environmental hazards, and about \$1 billion was reimbursed by private parties, such as former mine owners. Federal officials also estimated that it would cost billions more to address these mines in the future.

Federal Expenditures to Address Abandoned Hardrock Mines by Agency, Fiscal Years 2008 through 2017, in Nominal Dollars



Source: GAO analysis of agency information. | GAO-20-238

Nearly all of the federal and state agency officials and stakeholders GAO interviewed cited availability of resources and legal liability concerns as factors that limit efforts to address hazards at abandoned hardrock mines. Federal and state officials said their backlog of work is greater than what can be done with available staff and budgets, but they have taken steps to collaborate to help leverage resources. State officials and stakeholders, such as conservation groups, said they want to help address environmental hazards that they did not cause at abandoned hardrock mines. However, they generally do not do so because they are concerned about becoming legally responsible for the entire cost of addressing contamination at an abandoned mine if they attempt partial cleanup. EPA officials said they are considering new ways to encourage volunteer participation, in addition to existing administrative tools.

Contents

Letter		1
	Background	5
	Federal and State Agencies Identified Several Hundred Thousand Abandoned Hardrock Mine Features, Over 100,000 of Which May Be Hazardous	16
	Agencies Spent about \$300 Million Annually from Fiscal Years 2008 through 2017 to Address Abandoned Hardrock Mines and Estimate Billions More in Future Costs	23
	Federal and State Agencies and Stakeholders Cited Availability of Resources and Legal Liability Concerns as Factors That Limit Efforts to Address Abandoned Hardrock Mines	36
	Agency Comments	42

Appendix I	Objectives, Scope, and Methodology	44
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Appendix II	Federal Expenditures to Address Abandoned Hardrock Mines, by State, Fiscal Years 2008 through 2017	52
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Appendix III	GAO Contact and Staff Acknowledgments	55
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Tables		
	Table 1: Number of Abandoned Hardrock Mine Features That Pose or May Pose Physical Safety and Environmental Hazards Identified in Federal Agency Databases, as of May 2019	17
	Table 2: Federal Expenditures to Address Abandoned Hardrock Mines, by Type of Hazard, Fiscal Years 2008 through 2017	27
	Table 3: Estimated State Expenditures of Nonfederal Funds to Address Abandoned Hardrock Mines, by State and Type of Hazard, Fiscal Years 2008 through 2017	29
	Table 4: Total Federal Expenditures to Address Abandoned Hardrock Mines by State, Fiscal Years 2008 through 2017	52

Figures

Figure 1: Examples of Cleanup Activities That Could Take Place at Abandoned Hardrock Mine Sites	8
Figure 2: Federal Agency Information about Confirmed and Unconfirmed Physical Safety and Environmental Hazards, and Total Estimated Abandoned Hardrock Mine Features, as of May 2019	19
Figure 3: Federal Agency Expenditures to Address Abandoned Hardrock Mines, Fiscal Years 2008 through 2017	24
Figure 4: Abandoned Hardrock Mine Tunnel Opening Secured with a Gate to Allow Bat Access on Bureau of Land Management Land in Colorado	25

Abbreviations

BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
EPA	Environmental Protection Agency
OSMRE	Office of Surface Mining Reclamation and Enforcement
Park Service	National Park Service
USDA	U.S. Department of Agriculture

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March 5, 2020

The Honorable Tom Udall
Ranking Member
Subcommittee on Interior, Environment, and Related Agencies
Committee on Appropriations
United States Senate

Dear Mr. Udall:

The General Mining Act of 1872 allowed individuals to stake claims and obtain exclusive rights to gold, silver, copper, and other valuable hardrock mineral deposits on land belonging to the United States.¹ Until the federal government established requirements in the 1970s for mine operators to reclaim the land after their operations ceased²—for example, by regrading or reshaping the disturbed land—an operator could extract hardrock minerals and abandon the mine without reclaiming it.³ With populations growing in the western United States, abandoned mines that once were remote are now much closer to population centers, according to a U.S. government report.⁴

¹Federal minerals are commonly classified as locatable, leasable, or saleable. For the purposes of this report, we use the term hardrock minerals to refer to locatable minerals. Locatable minerals include, for example, copper, lead, zinc, magnesium, gold, silver, and uranium—those minerals that are not leasable or saleable. Leasable minerals include oil, gas, coal, phosphate, and potash. Saleable minerals include common varieties of sand, stone, and gravel, typically used to construct roads, bridges, dams, and buildings. This report focuses on abandoned hardrock mines. There are also abandoned leasable and saleable mineral mines, such as abandoned coal mines and stone quarries, but they are not included in this report.

²Under the Federal Land Policy Management Act of 1976, the Bureau of Land Management issued regulations, effective in 1981, that required mining operators to reclaim the bureau's land disturbed by hardrock mining. The Forest Service began requiring reclamation and financial assurances in 1974.

³Reclamation can vary by location, but it generally involves such activities as regrading and reshaping the disturbed land to conform to adjacent land forms and to minimize erosion, removing or stabilizing buildings and other structures to reduce safety risks, removing mining roads to prevent damage from future traffic, and establishing self-sustaining vegetation.

⁴Forest Service and Bureau of Land Management, *Abandoned Mine Lands: A Decade of Progress Reclaiming Hardrock Mines*, FS-891 and BLM-WO-GI-07-013-3720 (Washington, D.C.: September 2007).

Unsecured mine tunnels, decaying structures, pits, and other hazardous features are found at many abandoned mines and can endanger the physical safety of nearby residents and visitors to public lands. Abandoned mines can also cause environmental degradation and hazardous conditions that may pose risks to human health and the environment, such as draining highly acidic water into soil and streams. In many cases, the original mine operator is deceased or the mining company has dissolved, leaving no private entity to pay for the cleanup.

Various government agencies and other entities are involved in addressing abandoned hardrock mines. Specifically, the U.S. Department of Agriculture's (USDA) Forest Service and the Department of the Interior's Bureau of Land Management (BLM) and National Park Service (Park Service) operate programs to address the physical safety and environmental hazards found at abandoned hardrock mines on the approximately 530 million acres of public lands they manage. In addition, the Environmental Protection Agency (EPA) administers the Superfund program, which addresses risks to human health and the environment associated with abandoned hardrock mines on nonfederal lands, among other things. Several states also operate programs that identify and address physical safety and environmental hazards at abandoned hardrock mines on both federal and nonfederal lands within their borders. Interior's Office of Surface Mining Reclamation and Enforcement (OSMRE) awards grants to states and Indian tribes with abandoned hardrock mine programs to conduct portions of this work. Some stakeholders—including nongovernmental organizations, local citizen groups, and mining companies—participate in projects to address physical safety and environmental hazards at abandoned hardrock mines.

We previously reported information on abandoned hardrock mines, including the number of mines and amount of federal agency spending to address these mines.⁵ You asked us to provide updated information about abandoned hardrock mines. This report describes (1) what is known about the number of abandoned hardrock mines in the United States; (2) federal and state agency expenditures to address abandoned

⁵For example, see GAO, *Hardrock Mining: Information on Abandoned Mines and Value and Coverage of Financial Assurances on BLM Land*, [GAO-08-574T](#) (Washington, D.C.: Mar. 12, 2008); *Hardrock Mining: Information on State Royalties and the Number of Abandoned Mine Sites and Hazards*, [GAO-09-854T](#) (Washington, D.C.: July 14, 2009); *Abandoned Mines: Information on the Number of Hardrock Mines, Cost of Cleanup, and Value of Financial Assurances*, [GAO-11-834T](#) (Washington, D.C.: July 14, 2011); and *Hazardous Waste: Agencies Should Take Steps to Improve Information on USDA's and Interior's Potentially Contaminated Sites*, [GAO-15-35](#) (Washington, D.C.: Jan. 16, 2015).

hardrock mines from fiscal years 2008 through 2017, and what is known about future costs to address these mines; and (3) factors that limit federal and state agencies' and stakeholders' efforts to address abandoned hardrock mines.

To describe what is known about the number of abandoned hardrock mines in the United States, we obtained and summarized information about abandoned hardrock mine sites and features—such as mine tunnels, pits, and waste piles—that the Forest Service, BLM, the Park Service, and EPA maintained in databases as of May 2019, the most current at the time of our review. We also obtained information on the agencies' estimates of the number of additional abandoned hardrock mine sites and features that exist but are not captured in their databases, where applicable. Additionally, we collected information from officials with state agencies that address abandoned hardrock mines in 13 western states through semi-structured interviews about the number of abandoned hardrock mine sites and features they identified as of May 2019, the most current at the time of our review.⁶ We selected these states because our 2008 report and other federal and state agency reports indicated that most of the abandoned hardrock mines in the country are in these states.⁷ To assess the reliability of the federal and state inventory information, we checked for missing data and errors, reviewed documents about the data systems, and discussed the data and any limitations with federal and state agency officials. We determined that the data were sufficiently reliable to describe what these agencies know about abandoned hardrock mines within their jurisdictions.

To describe federal and state expenditures and what is known about future costs to address abandoned hardrock mines, we obtained and summarized expenditure information from Forest Service, BLM, Park Service, EPA, and OSMRE financial systems for fiscal years 2008 through 2017, the most current at the time of our review.⁸ We also collected information through our semi-structured interviews with officials from the 13 selected states about their expenditures of nonfederal and federal funds during the same time period and summarized the

⁶The 13 states are Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington, and Wyoming.

⁷See [GAO-08-574T](#) for information about the number of abandoned hardrock mines in these states.

⁸In this report, we use the word spent to mean agency expenditures. An expenditure is an actual spending of funds, an outlay.

information. To assess the reliability of the information obtained from these federal and state agencies, we tested the data for accuracy by checking for errors, among other things. We discussed the expenditure information, each agency's data system, and any limitations with agency officials. We determined that the data were sufficiently reliable for the purpose of describing federal and state expenditures. We also reviewed and summarized federal agency documents containing their estimates of future costs to identify and address physical safety and environmental hazards at abandoned hardrock mines that have not been addressed.

To identify factors that limit federal and state agencies' and stakeholders' efforts to address abandoned hardrock mines, we reviewed relevant agency documents that describe limiting factors and interviewed Forest Service, BLM, Park Service, EPA, and OSMRE headquarters officials. We also interviewed officials from the regional or state offices of these federal agencies who work in Colorado, Montana, and Nevada. We selected these states for geographic diversity, higher numbers of abandoned hardrock mines, and variation in the types of hazards posed by abandoned mines in these states. For these three states, we also interviewed officials with state agencies that address abandoned hardrock mines. In addition, we interviewed a sample of stakeholders, selected to provide perspectives from industry associations, nongovernmental organizations, state agency associations, and individuals with long-standing involvement with abandoned hardrock mines. We identified and selected these stakeholders based on our previous work, a review of relevant literature, interviews with federal and state agency officials, and recommendations from stakeholders.⁹ The sample of states and stakeholders is not generalizable, but provides perspectives on factors that limit efforts to address abandoned hardrock mines. In total, we interviewed officials from 13 federal offices and three state offices and representatives from 11 stakeholders, and we identified the factors that they cited frequently. Appendix I contains a detailed description of our scope and methodology.

We conducted this performance audit from June 2018 to March 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that

⁹[GAO-08-574T](#).

the evidence obtained provides a reasonable basis for our findings based on our audit objectives.

Background

This section provides information about abandoned hardrock mines, sites, and features; and federal and state agency roles in addressing abandoned hardrock mines.

Abandoned Hardrock Mines, Sites, and Features

Federal and state agencies generally describe abandoned hardrock mines in terms of mine sites, the individual features that comprise a site, or both. However, these agencies do not all have a common definition for what constitutes an abandoned hardrock mine or mine site, as we found in 2008.¹⁰ The agencies generally agree on what constitutes an individual feature—for example, a feature can be a mine opening (such as a tunnel, pit, or vertical shaft), a structure, or a pile of discarded materials (known as mine tailings or waste rock) that is left behind after ore is crushed and the valuable minerals are extracted. They also generally agree that an abandoned mine site can be comprised of only one feature (e.g., an isolated mine shaft) or many features (e.g., an area with multiple entries, shafts, open pits, mill buildings, and tailings piles).¹¹ There is no universally agreed-upon average number of features per site. Also, not all federal and state agencies count both sites and features—some agencies only count sites, some only count features, and some count both.

The individual features that make up a mine site may pose hazards to physical safety and risks to human health and the environment.

¹⁰Federal and state agencies' abandoned hardrock mine definitions contain similar elements, even if they are not identical. Given no commonly accepted definition of a mine site, we developed a suggested standard definition in consultation with mining experts at state agency associations focused on addressing abandoned hardrock mines. We defined a mine site to include all associated facilities, structures, improvements, and disturbances at a distinct location associated with activities to support a past operation. Such activities could include prospecting, exploration, excavation, extraction, or processing of mineral deposits locatable under the General Mining Act of 1872. See [GAO-08-574T](#).

¹¹Some EPA sites encompass entire mining districts, which are larger aggregations of many sites in a broad geographic area historically associated with mining particular minerals. A mining district can contain several to hundreds of abandoned mine sites and an even greater number of individual features.

Physical safety hazards. Abandoned hardrock mine features that pose physical safety hazards generally present immediate danger of injury or death. Examples of physical safety hazards include

- unstable mine tunnels that can collapse without warning;
- unmarked open mine shafts and deep pits that pose a danger to individuals who may inadvertently drive off-road vehicles into them; and
- deadly concentrations of gases, such as carbon monoxide and methane, present inside some mines that can asphyxiate explorers.

To address physical safety hazards, federal and state agencies typically focus on identifying and mitigating the risk from individual features. They may safeguard these features by, for example, filling, capping, or gating the abandoned mine openings with engineered structures. After a dangerous feature is identified, an agency may post a warning sign or erect a fence to temporarily limit access to the feature until the agency can permanently close it. According to a 2008 Interior Inspector General report, physical hazards require the least expertise to identify and evaluate and the least funding to fix or mitigate.¹²

Environmental hazards. Mine features can also contribute to degradation of the environment and present short- and long-term risks to human health. For this report, we refer to these collectively as environmental hazards. People may be exposed to these hazards when recreating or living near an abandoned mine. Examples of environmental hazards include

- a mine tunnel that drains acidic water laden with heavy metals into a nearby stream;
- waste rock or tailings piles located along the banks or in the middle of streams that release hazardous substances such as arsenic, lead, and mercury into the water; and
- tailings that have dispersed into a surrounding community's soil, exposing residents to harmful substances.

¹²Department of the Interior, Office of Inspector General, *Audit Report: Abandoned Mine Lands in the Department of the Interior*, C-IN-MOA-0004-2007 (Washington, D.C.: July 2008).

The extent of environmental hazards at abandoned mines can vary widely, from sites that contain one draining tunnel and a few waste rock piles to sites with extensive underground tunnel networks, many waste rock piles, and miles of dispersed tailings. Some contaminated hardrock mine sites are included on the National Priorities List, which includes some of the most seriously contaminated sites that EPA identifies for long-term cleanup. The work required to address environmental hazards varies depending on the extent, type, and concentration of contaminants. For example, agencies may take one or more of the following actions at a site:

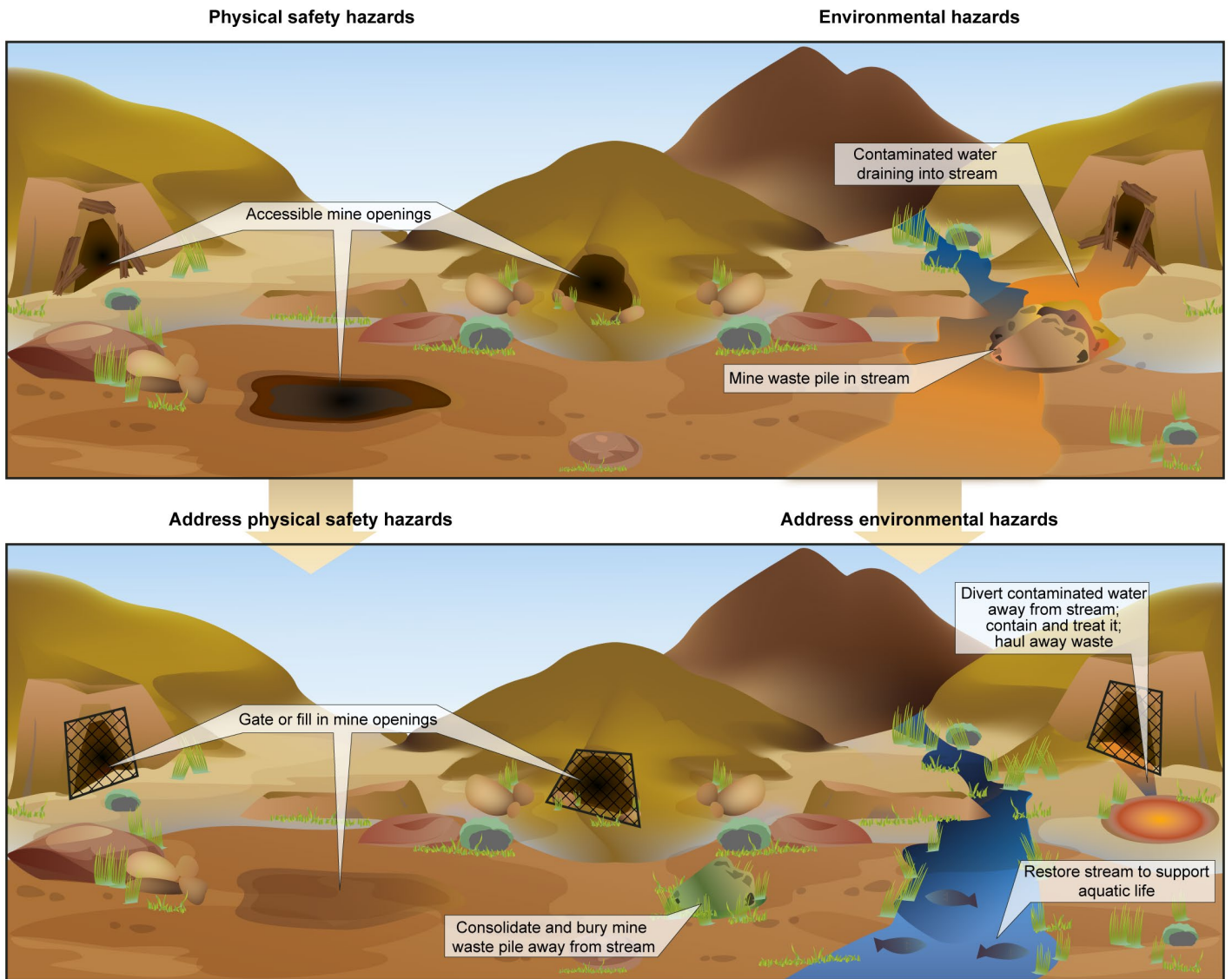
- remove waste rock or tailings from streams;
- develop passive water treatment systems that allow water to flow out of mines into treatment ponds;
- manage the waste on-site or transport it off-site for disposal; or
- establish active water treatment systems for the most contaminated sites that require continuous long-term monitoring, among other actions.

According to EPA documents, sites with environmental hazards can cost hundreds of millions of dollars and take many years to address. For example, as of July 2019, the actual costs at the 25 most expensive mine and mineral processing sites ranged from \$50 million to \$583 million per site, and EPA had been working on some of the sites for over 20 years.¹³ Furthermore, agencies monitor remedies after completion to help ensure that they are achieving the desired results.

Figure 1 depicts examples of physical safety and environmental hazards found at abandoned hardrock mine sites and activities that could take place to address them.

¹³Amounts are in nominal dollars.

Figure 1: Examples of Cleanup Activities That Could Take Place at Abandoned Hardrock Mine Sites



Source: GAO analysis of federal agency information. | GAO-20-238

Land ownership at abandoned mine sites is often complicated. The General Mining Act authorizes miners to patent, or purchase, the land associated with their mining claims—thereby mined land often passed

from federal to private ownership.¹⁴ Partly because of this, many abandoned mine sites are a patchwork of federal, private, and other lands, and the ownership boundaries are not always clear. Agencies refer to these sites as mixed ownership sites.

Federal and State Agency Roles in Addressing Abandoned Hardrock Mines

The Forest Service, BLM, the Park Service, EPA, and OSMRE, as well as states with abandoned hardrock mines, administer programs that address abandoned hardrock mines.¹⁵ Specifically, these federal and state agencies collect information about abandoned hardrock mine sites and features, and the associated hazards, on land under their jurisdictions.¹⁶ These agencies also safeguard the physical safety hazards and clean up the environmental hazards present at these mines. Agencies inventory and address these mines based on their different authorizing statutes, regulations, and missions.

Forest Service

The Forest Service is responsible for managing about 193 million acres of national forests and grasslands throughout the United States. The Forest Service's Safety and Environmental Restoration program oversees the

¹⁴A moratorium on new patents—in the form of a prohibition on Interior expending or obligating funds to accept or process applications for or issue any such patents—was first enacted in 1994 for fiscal year 1995 Interior appropriations. §112 of Title I of the Department of the Interior and Related Agencies Appropriations Act, 1995, P.L. 103-332, 108 Stat. 2499, 2519 (enacted Sept. 30, 1994). That moratorium remains in effect as of the most recent appropriations acts. § 404(a) of Title IV of Division E of the Consolidated Appropriations Act, 2019, P.L. 116-6, 133 Stat. 13, 36 (enacted Feb. 15, 2019); § 404(a) of Title IV of Division D of the Further Consolidated Appropriations Act, 2020, P.L. 116-94, 133 Stat 2534, 2742 (enacted Dec. 20, 2019).

¹⁵Indian tribes also work to address abandoned hardrock mines on or near their land, often in coordination with EPA or OSMRE.

¹⁶Federal land management agencies typically began developing their inventories of abandoned hardrock mines in the 1980s and 1990s, basing them on historic maps, mine records, and surveys.

agency's work on abandoned hardrock mines.¹⁷ The Forest Service distributed \$15.9 million in appropriations to the Safety and Environmental Restoration program in fiscal year 2019. USDA also distributed about \$6.9 million in fiscal year 2019 to the Forest Service to address environmental hazards at several abandoned hardrock mines.¹⁸ USDA seeks recovery of cleanup costs under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), from responsible parties, such as current and former owners and operators of a contaminated site, to help reimburse costs at such sites.¹⁹

The Forest Service develops and maintains its information about abandoned hardrock mines primarily at its regional, national forest, and district offices.²⁰ In general, the Forest Service tracks physical safety hazards by feature and environmental hazards by mine site. As of November 2019, the Forest Service did not have a national inventory of abandoned hardrock mine features or sites and the physical safety hazards they may pose.²¹ However, information about environmental hazards at abandoned hardrock mine sites is contained in a database maintained by USDA that tracks progress on all hazardous waste cleanup projects funded by the department, including projects at abandoned

¹⁷The Forest Service created this program in fiscal year 2017 as a combined budget line item for its two programs that address abandoned hardrock mines—specifically, the Abandoned Mine Lands program addresses physical safety hazards, and the Environmental Compliance and Protection program addresses environmental hazards at abandoned mines and other contaminated sites.

¹⁸USDA distributed \$250,000 from the department-wide Hazardous Materials Management appropriation to address one mine site in Colorado and \$6.6 million from a bankruptcy settlement that covered several mine sites on Forest Service land.

¹⁹P.L. 96–510, 94 Stat. 2767 (enacted Dec. 11, 1980); codified as amended at 42 U.S.C. §§ 9601-9675.

²⁰The Forest Service addresses hardrock mines on or affecting public lands where all prior activities have ceased and there are no active mine claims or indications that a former operator intends to resume mining activities. See Forest Service, Abandoned Mines Definition and Safety, memorandum from Washington Office to Regional Foresters (Washington, D.C.: Feb. 4, 2014).

²¹We found in 2015 that the Forest Service created a national abandoned mine database in 2008 that would have tracked safety hazards by importing data from USDA, regional inventories, and other sources; however, this led to redundancies and inconsistencies with the data. As a result, the agency did not use the database because it did not have sufficient resources to address the data inconsistencies, according to Forest Service officials. See [GAO-15-35](#).

hardrock mines. Forest Service regional and national forest staff inventory, assess, mitigate, and monitor the physical safety and environmental hazards at abandoned hardrock mine sites on Forest Service-managed land as part of their daily responsibilities.

BLM

BLM manages 245 million acres of public lands in the United States, located primarily in the western states and Alaska. BLM's Abandoned Mine Lands program is aimed at protecting public safety and reducing liabilities by eliminating or minimizing physical safety and environmental hazards posed by abandoned mines, among other objectives.²² BLM's Hazardous Materials Management program also addresses environmental hazards at all types of contaminated sites, including abandoned hardrock mines. In fiscal year 2019, BLM received a total of \$38.5 million in appropriations for these programs.²³ In addition, Interior distributed \$2.7 million to BLM in fiscal year 2019 from the Central Hazardous Materials Fund—an Interior account that supports response actions undertaken at contaminated sites pursuant to CERCLA—for work at abandoned hardrock mines.

BLM maintains a national inventory of abandoned hardrock mines in its Abandoned Mines and Site Cleanup Module database to help track information about sites, features, and hazards. However, as of 2019, BLM officials said the agency is shifting from tracking information by site, which can be subject to interpretation, to primarily tracking and reporting abandoned mine features. In addition to its abandoned mine database, BLM submits a subset of information about its contaminated abandoned

²²According to BLM's abandoned mine policy, an abandoned hardrock mine is one that is on or affecting public lands administered by BLM, at which mine-related operations ceased, and with no evidence that the miner intended to resume mining, as of January 1, 1981—the date the agency's regulations requiring mining operators to reclaim disturbed land became effective. BLM's handbook further states that the agency may address hazards at mines where operations occurred after 1981 if (1) the entity that submitted a Notice or Plan of Operation is not responsible for the site disturbance and/or is not willing or able to clean up the site and (2) BLM staff have notified the claimant or entity and received approval from the Office of the Solicitor. See Bureau of Land Management, *Abandoned Mine Land Program Policy Manual*, BLM MS-3720 (Sept. 30, 2013), and *Abandoned Mine Land Program Policy Handbook*, BLM H-3720-1 (Mar. 20, 2007).

²³In fiscal year 2019, BLM merged the Abandoned Mine Lands and Hazardous Materials Management programs into one program to achieve efficiencies, according to Interior budget documents for that year.

mines to Interior for inclusion on the department's list of contaminated sites, the Environmental and Disposal Liabilities list. BLM state, district, and field office staff inventory, assess, and mitigate the physical safety and environmental hazards at abandoned hardrock mines on BLM-managed land while conducting their daily work.²⁴

Park Service

The Park Service manages more than 85 million acres in 419 park units across the country. The Park Service addresses abandoned hardrock mines on this land through an abandoned mine safety program and an environmental compliance and cleanup program.²⁵ In fiscal year 2019, the Park Service received \$5 million in appropriations to address physical safety hazards on abandoned mineral lands.²⁶ Interior also distributed \$890,000 from the Central Hazardous Materials Fund to the Park Service to address contaminated abandoned hardrock mine sites in fiscal year 2019. The Park Service recovers costs from responsible parties at abandoned mine sites through CERCLA.

The Park Service maintains information about abandoned hardrock mine sites and features in its Abandoned Mineral Lands Database. In 2013, the Park Service completed a system-wide inventory and assessment project to identify abandoned mines on lands it manages.²⁷ In addition, the Park Service submits information to Interior about contaminated abandoned

²⁴According to BLM's abandoned mine handbook, field staff are expected to enter information about all abandoned mine features into the database. BLM then determines the most appropriate entity to fund the work to address the feature based on mining claim status, date the mine became inactive, existence of a viable potentially responsible party, and other factors. BLM H-3720-1.

²⁵The Park Service addresses abandoned mineral lands, of which abandoned hardrock mines are one type. Abandoned mineral lands include former mine areas where the Park Service takes action to reduce hazards and impacts to resources. See National Park Service, *Abandoned Mineral Lands in the National Park System—Comprehensive Inventory and Assessment*, Natural Resource Technical Report NPS/NRSS/GRD/NRTR—2014/906 (Denver, CO: September 2014).

²⁶In fiscal year 2018, the Park Service created a new budget category to fund this work. According to the agency's fiscal year 2018 budget documents, addressing hazards at abandoned mines was not typically funded prior to 2018 because projects to address abandoned mines competed for funding with all other line item construction projects, such as visitor center and other facility repairs.

²⁷Previously, the Park Service compiled abandoned mine information in a more rudimentary database. See NPS/NRSS/GRD/NRTR—2014/906.

mine sites for inclusion on the Environmental and Disposal Liabilities list. Park Service headquarters and regional offices may assist park units in addressing hazards and preserving cultural resources and wildlife habitat at abandoned hardrock mines on Park Service-managed land.

EPA

EPA administers the Superfund program, which was established under CERCLA to address the threats that contaminated waste sites pose to human health and the environment. As part of the Superfund program, EPA oversees and conducts investigations and cleanup actions at a variety of hardrock mine and mineral processing sites on private and other nonfederal lands and mixed ownership sites.²⁸ The Superfund program operates on the principle that polluters are to pay for the cleanups rather than passing on the costs to taxpayers. EPA may compel parties statutorily responsible for contamination at sites to clean them up or to reimburse EPA for its cleanup costs.²⁹ Responsible parties at abandoned hardrock mines could include current or former owners or operators of a site; persons who arranged for disposal, treatment, or transportation of hazardous substances; or the transporters of hazardous substances. To address contaminated sites—including abandoned mines—that do not have viable responsible parties, EPA uses funding from appropriations to the Superfund program, which were approximately \$1.1 billion in fiscal year 2019.

EPA maintains information about abandoned hardrock mine and mineral processing sites on nonfederal lands, including tribal lands, and mixed

²⁸According to EPA's website, abandoned mine lands are lands, waters, and surrounding watersheds contaminated or scarred by extraction, beneficiation, or processing of ores and minerals, excluding coal, and where mining or processing is inactive. See Environmental Protection Agency, "Abandoned Mine Lands: Basic Information," accessed November 21, 2019, <https://www.epa.gov/superfund/abandoned-mine-lands-basic-information-0>. EPA officials said active sites often have components that were mined historically and abandoned, so EPA addresses a small number of sites with active or recent mine activity.

²⁹Courts have interpreted the liability of responsible parties under CERCLA to be strict, joint and several, and retroactive. Under strict or "no fault" liability, a party may be liable for cleanup even though its actions were not considered improper when it disposed of the wastes. Under joint and several liability, when the harm done is indivisible, one party can be held responsible for the full cost of the remedy even though that party may have disposed of only a portion of the hazardous substances at the site. Under retroactive liability, parties can be held responsible for actions that took place before CERCLA was enacted.

ownership sites in its national database of contaminated sites, the Superfund Enterprise Management System. EPA counts these mines and processing facilities by site and not by individual mine feature. According to EPA officials, many of the mine sites included in the database may contain tens to hundreds of individual features. In addition, EPA does not count sites that pose solely a physical safety hazard since they fall outside of the Superfund program mission.

In addition, EPA and authorized states address certain abandoned hardrock mines in accordance with the Clean Water Act. Specifically, EPA and state agencies regulate discharges of pollutants to waters of the United States at abandoned mine sites under the act, such as mine tunnels draining contaminated water that exceeds water quality standards.³⁰ To comply with the act, an entity operating a cleanup project involving a draining mine tunnel or other concentrated discharge source must obtain a permit, under which the discharge must be treated or managed to meet and maintain applicable water quality standards.

OSMRE

OSMRE's Abandoned Mine Land program primarily focuses on reclaiming and restoring land and water resources degraded by past coal mining, but the program also supports reclamation at abandoned hardrock mines.³¹ In accordance with the Surface Mining Control and Reclamation Act of 1977, as amended, OSMRE can provide grants for the reclamation of certain abandoned hardrock mines under limited circumstances—in particular, after a state or Indian tribe certifies that it has cleaned up its abandoned coal mine sites and the Secretary of the Interior approves the certification.³² Absent such certification, OSMRE can award these grants at the request of a state or Indian tribe where necessary to protect the public health, safety, general welfare, and

³⁰The source of such a discharge is referred to as a point source, which is any discernible confined and discrete conveyance—including but not limited to a pipe, ditch, channel, tunnel, conduit, well, or discrete fissure—from which pollutants are or may be discharged. 33 U.S.C. § 1362(14).

³¹The Abandoned Mine Land program is funded, in part, by fees on coal production.

³²A state or tribe may certify to the Secretary of the Interior that it has completed reclamation of all known priority safety hazards at eligible abandoned coal mines and coal mining-affected sites within its jurisdiction. The Secretary reviews the certification and concurs if the Secretary determines, after public notice and comment, that the certification is correct. 30 U.S.C. § 1240a. See also 30 C.F.R. §§ 875.13 – 875.16.

property from extreme danger of adverse effects from the abandoned hardrock mine, and the Secretary of the Interior grants the request.³³ In fiscal year 2019, OSMRE distributed a total of \$310.5 million in grants to states and tribes to address abandoned coal and non-coal mines.

OSMRE does not maintain an inventory of abandoned hardrock mines since the Abandoned Mine Land program's primary objective is to address abandoned coal mines.³⁴ States that receive grants from OSMRE to address non-coal abandoned mines may maintain their own inventories of abandoned hardrock mines. According to OSMRE budget documents, western states in particular often use OSMRE grants to address physical safety hazards at high-priority abandoned hardrock mines for which there is no other source of federal funding.

State Agencies

States identify and address physical safety and environmental hazards at abandoned hardrock mines on state, county, and private lands within their borders, often through state abandoned mine programs. States may also work with federal agencies to identify and address these hazards on federal land. Some state agencies manage or oversee cleanup activities under CERCLA at abandoned hardrock mines. State agencies may receive funds to support their work at abandoned hardrock mines from nonfederal and federal sources, including state-appropriated funds, responsible parties under CERCLA, and cooperative funding agreements or grants from federal agencies. States with abandoned hardrock mines generally maintain databases or inventories that identify the locations of these mines and any associated hazards.

³³30 C.F.R. § 875.12.

³⁴OSMRE maintains a national inventory of abandoned coal mines that serves as a planning and evaluation tool for OSMRE, states, and tribes. OSMRE officials said the database also contains some information about abandoned hardrock mines, but it is limited to those mines that states addressed using OSMRE grants.

Federal and State Agencies Identified Several Hundred Thousand Abandoned Hardrock Mine Features, Over 100,000 of Which May Be Hazardous

As of May 2019, the Forest Service, BLM, the Park Service, and EPA together identified in their databases at least 140,652 abandoned hardrock mine features—of which over 60 percent are known to pose or may pose physical safety or environmental hazards. Officials from 13 western states also identified from their state databases about 246,000 abandoned hardrock mine features on federal and nonfederal lands within their states, including about 126,000 features that pose physical safety or environmental hazards. Some state information overlaps with federal agency information, but the extent of overlap is unknown, according to state officials. Federal and state officials also estimated that there likely are hundreds of thousands of additional abandoned hardrock mine features that they have not yet captured in their databases.

Federal Agencies Identified At Least 140,652 Abandoned Mine Features, about 89,000 of Which Pose or May Pose Physical Safety or Environmental Hazards

The Forest Service, BLM, the Park Service, and EPA identified in their databases at least 140,652 abandoned hardrock mine features, as of May 2019.³⁵ Of this amount, BLM identified 103,029 features and the Park Service identified 20,675 features. As previously noted, the Forest Service and EPA track abandoned mines by site and not by features associated with the sites; the Forest Service identified 16,375 sites and EPA identified 573 sites. According to agency officials, many abandoned

³⁵Forest Service, BLM, and Park Service databases generally capture information about abandoned mines on the federal lands these agencies manage. EPA officials said the agency's database includes information about 66 mixed ownership sites, which may also be included in the other agencies' totals. As a result, there likely is little overlap between the federal agencies' numbers of mines. In addition, the agencies' numbers are as of May 2019 and may change over time as sites are added or deleted in the data systems.

hardrock mine sites contain more than one feature.³⁶ Since there is no agreed-upon average number of features per site, we counted the minimum of one feature per Forest Service and EPA site for the purpose of this analysis. As a result, the total number of features identified by federal agencies likely is underestimated.

Of the 140,652 total features, about 89,000 features are known to pose or may pose a physical safety or environmental hazard, according to information in the federal agencies' databases. Specifically, agencies

- confirmed 7,802 features pose a hazard, of which 6,439 pose a physical safety hazard and 1,363 pose an environmental hazard; and
- identified 81,541 features with an unconfirmed hazard (whereby agency staff had not assessed current conditions in person to confirm the hazard), of which 60,279 may pose a physical safety hazard and 21,262 may pose an environmental hazard.

Table 1 shows information about abandoned hardrock mine features that pose or may pose physical safety and environmental hazards, by agency.

Table 1: Number of Abandoned Hardrock Mine Features That Pose or May Pose Physical Safety and Environmental Hazards Identified in Federal Agency Databases, as of May 2019

Agency	Physical safety hazards		Environmental hazards		Hazard mitigated or not found	Total
	Features with unconfirmed hazard	Features with confirmed hazard	Features with unconfirmed hazard	Features with confirmed hazard		
Bureau of Land Management	60,279	4,492	6,003	374	31,881	103,029
Environmental Protection Agency	n/a	n/a	n/a	552 ^a	21 ^{a,b}	573 ^a
Forest Service	Not Applicable ^c	Not Applicable ^c	15,247 ^a	380 ^a	748 ^a	16,375 ^a
National Park Service	n/a	1,947	12 ^a	57 ^a	18,659	20,675
Total	60,279	6,439	21,262	1,363	51,309	140,652

Legend:

n/a = not applicable

Source: GAO analysis of agency information. | GAO-20-238

³⁶For example, EPA officials said that most of the mine and mineral processing sites included on the National Priorities List contain many more than one feature. One proposed site, the Bonita Peak site in Colorado, contains at least 48 separate features, according to EPA officials. In addition, a senior Forest Service official said that sites in USDA's database may contain any number of features.

Notes: Physical safety hazards present immediate danger of injury or death, and environmental hazards present short- and long-term risks to human health and the environment. Unconfirmed hazards are those where agency staff have not assessed current conditions in person to confirm the presence of a hazard.

^aNumber provided was by abandoned hardrock mine site and not by feature. A mine site is a collection of one or more individual features associated with a mine. Since there is no agreed-upon average number of features per site, we counted the minimum of one feature per site. As a result, the total number of features associated with these sites likely is underestimated.

^bThis number reflects sites that were on the National Priorities List—which includes some of the most seriously contaminated sites that the Environmental Protection Agency identifies for long-term cleanup—but that have been deleted from the list because the cleanup is complete.

^cThe Forest Service did not provide this information because it is tracked in regional, national forest, and district offices and not in a central database.

However, agency officials said there could be approximately 393,000 more abandoned hardrock mine features on federal land that the agencies identified on historic maps but have not captured in their databases. For example, based on the Forest Service's initial estimate of the total number of abandoned hardrock mines, there may be approximately 13,000 additional features on Forest Service land not captured in a central database.³⁷ In addition, BLM officials estimated there are about 380,000 abandoned hardrock mine features on the land BLM manages that are not captured in its abandoned mine database.³⁸ Park Service officials did not estimate a number of additional abandoned mines that might be in Park Service units; they said they believe their database is relatively comprehensive.³⁹ Given the Forest Service and BLM estimates of additional features not found in their databases, the

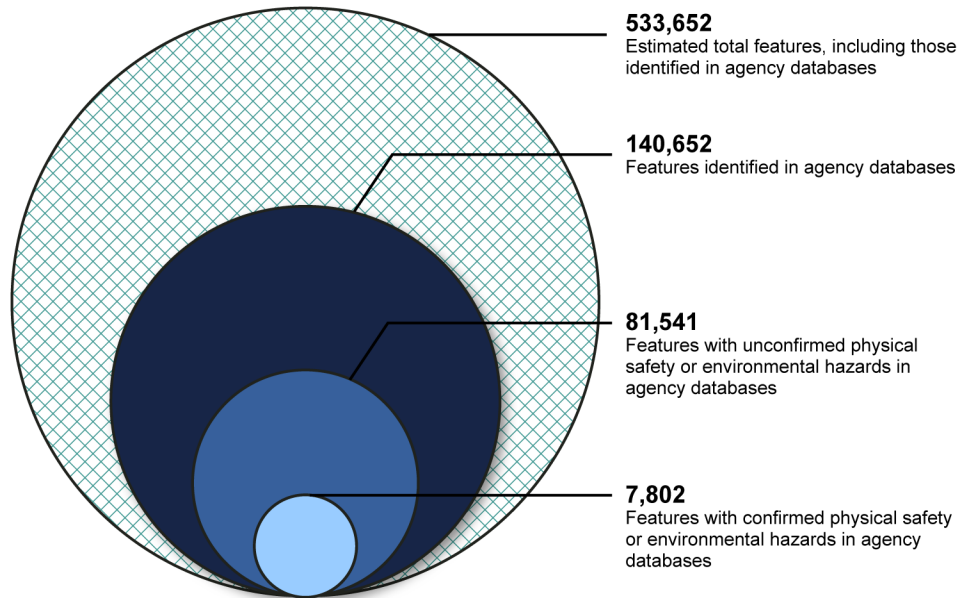
³⁷In 2007, the Forest Service estimated a total of approximately 29,000 abandoned hardrock mines on the land it manages, based on U.S. Geological Survey data. USDA's database of contaminated sites contains information for 16,375 abandoned mine sites out of the 29,000 estimated sites, which would indicate that approximately 13,000 additional mine sites on Forest Service land are not contained in USDA's database. In commenting on a draft of this report, a senior Forest Service official said the agency has been working to verify the original data, including visiting sites to confirm their locations. As a result, they expect that the agency's estimate of the total number of mines will continue to change. We assume that each site contains one feature for our analysis.

³⁸BLM officials said they used data from U.S. Geological Survey's Mineral Deposit database to generate this estimate. The database is a digital collection of the geospatial locations of all hardrock and non-hardrock mine symbols captured on topographic maps printed since the late 1800s. According to BLM officials, they analyzed these data to determine which of the mine symbols were likely on BLM land to help determine an estimated number of features.

³⁹Park Service officials said some features may not have been discovered, given the remote locations of many previously mined sites and possible new features that may appear from ground subsidence or fires. In addition, EPA did not provide an estimate of additional abandoned hardrock mines on nonfederal lands because they do not manage the land on which the sites may be located.

total number of estimated and identified abandoned hardrock mine features on lands within Forest Service, BLM, Park Service, and EPA jurisdiction is at least 533,652.⁴⁰ Figure 2 depicts federal agency information about the numbers of confirmed and unconfirmed physical safety and environmental hazards on the lands under these agencies' jurisdictions, in relation to the total estimated abandoned hardrock mine features, as of May 2019.

Figure 2: Federal Agency Information about Confirmed and Unconfirmed Physical Safety and Environmental Hazards, and Total Estimated Abandoned Hardrock Mine Features, as of May 2019



Source: GAO analysis of agency information. | GAO-20-238

Notes: Federal agencies include the Bureau of Land Management (BLM), Environmental Protection Agency (EPA), Forest Service, and National Park Service. Physical safety hazards present immediate danger of injury or death, and environmental hazards present short- and long-term risks to human health and the environment. The Forest Service and EPA provided information about abandoned hardrock mine sites and not features. Since there is no agreed-upon average number of features per site, we counted each reported site as having one feature. As a result, the total number of features associated with these sites likely is underestimated. Of the 81,541 total features with unconfirmed hazards (i.e., features that agency staff have not assessed in person to confirm the presence of a hazard), 60,279 features had unconfirmed physical safety hazards and 21,262 features had unconfirmed environmental hazards. Of the 7,802 total features with confirmed hazards, 6,439 features posed physical safety hazards and 1,363 features posed environmental hazards. Circles are not to scale.

⁴⁰This total includes the Forest Service's and BLM's estimates of 393,000 features that are not included in central databases and the 140,652 features that are contained in all of the federal agencies' databases.

To develop more comprehensive information about the total number of abandoned hardrock mine features on the lands they manage, the Forest Service and BLM are taking steps to improve their databases, including capturing information about abandoned mines that are not currently in a database. Specifically, Forest Service officials told us that they are establishing a centralized geospatial database that will consolidate information about abandoned hardrock mine features with physical safety hazards that is currently maintained in regional and national forest offices. They said they expect the new database will be populated in fiscal year 2020 and that it will provide regional and headquarters managers with better information about the extent of features with physical safety hazards.⁴¹ In addition, BLM officials said that field staff have been identifying and adding new features each year to its database, prioritizing features located close to communities and recreational areas. BLM officials said that they plan to update the database and communicate this information to field staff in fiscal year 2020 to help ensure staff enter information about new features into the database consistently.

Agencies in 13 States Identified about 246,000 Abandoned Mine Features in Their States, Including about 126,000 That Pose Physical Safety or Environmental Hazards

Officials with the 13 western states that we reviewed identified about 246,000 abandoned hardrock mine features on the federal, state, and private lands within their state borders, as of May 2019. As with the federal agencies, officials with five of the 13 states provided information about total mine sites and not features; as a result, we counted the minimum of one feature for each reported mine site for the purpose of our analysis.⁴² Of the 246,000 total features in these states, state officials

⁴¹In January 2015, we recommended that USDA direct the Forest Service to develop plans and procedures for completing its inventory of potentially contaminated sites, including abandoned mines. See [GAO-15-35](#). As of November 2019, USDA had partially responded to this recommendation by establishing the National Environmental Accomplishment Tracking system, which replaced a legacy database for contaminated sites. USDA officials said they also worked with Forest Service regional staff to remove duplicate entries and delete sites that are not on Forest Service-managed land from the new system.

⁴²The five states identified approximately 14,000 sites, and we counted one feature for each site for the purpose of our analysis.

estimated that about 115,000 features pose a physical safety hazard and about 11,000 features pose environmental hazards.⁴³

State officials said that many of the features identified in their databases were also likely to be found in the federal agencies' databases, but the extent of overlap is unknown. Specifically, the state officials' estimates include abandoned mine features on federal, state, and private land because states may work on abandoned hardrock mines on both federal and nonfederal lands. However, state officials are not always able to quantify the number of mine features on federal land versus private or state land. For example, some states' inventories are based on information from maps and databases that did not always include details about land ownership boundaries, which are necessary to differentiate on what lands the features are located. In addition, in instances in which the states could identify the features that are on federal land, such as in Utah and Nevada, state officials did not know how many of those features were also captured in federal agency databases.

Similar to the federal agencies, officials with the 13 states estimated that the actual number of abandoned hardrock mine features in their states is higher than the information contained in their databases. State officials noted that their inventories are incomplete, in part because they have not conducted comprehensive, on-the-ground work to identify all the abandoned mine features in their states. They primarily focus on addressing the hazards they have already identified. Nevertheless, state officials estimated that the number of abandoned hardrock mine features in the 13 states could total more than 620,000. For example, California officials we interviewed said field staff had identified more than 70,000 individual abandoned mine features in the state as of May 2019. However, based on information from topographic maps, they estimated that 274,000 total mine features exist statewide, with an undetermined number of physical safety and environmental hazards.

The states' estimates of abandoned hardrock mine features reflect the different ways states collect information about abandoned hardrock mines. For example, California and Nevada officials explained that they count each individual abandoned mine feature in their states, whereas Colorado and Utah officials said that they only collect information about potentially hazardous features. Colorado officials estimated that there are

⁴³Three states identified 454 sites with physical safety hazards, which we counted as one feature each. Seven states identified 1,584 sites with environmental hazards, which we counted as one feature each.

23,000 potentially hazardous abandoned hardrock mine features in the state. However, if the state were to count all of the features in Colorado, including shallow prospecting pits that are unlikely to pose a physical safety hazard, the officials said the total estimate would be hundreds of thousands of mine features. In addition, some states, including Idaho and California, reported numbers of abandoned mine features that included non-hardrock mines, such as sand and gravel pits, because their abandoned mine programs address different types of abandoned mines.

Agencies Spent about \$300 Million Annually from Fiscal Years 2008 through 2017 to Address Abandoned Hardrock Mines and Estimate Billions More in Future Costs

Federal agencies spent, on average, about \$287 million annually identifying, cleaning up, and monitoring abandoned hardrock mines, for a total of about \$2.9 billion, from fiscal years 2008 through 2017.⁴⁴ The Forest Service, BLM, the Park Service, EPA, and OSMRE primarily worked in partnership with other federal and state agencies and some nongovernmental stakeholders when addressing these mines, according to federal officials. Officials from the 13 western states we reviewed estimated spending an additional total of about \$117 million in nonfederal funds over the 10-year period, or an average of nearly \$12 million annually, to address abandoned hardrock mines within their states. Federal agency officials said they estimated it would cost billions more to address abandoned hardrock mines in the future.

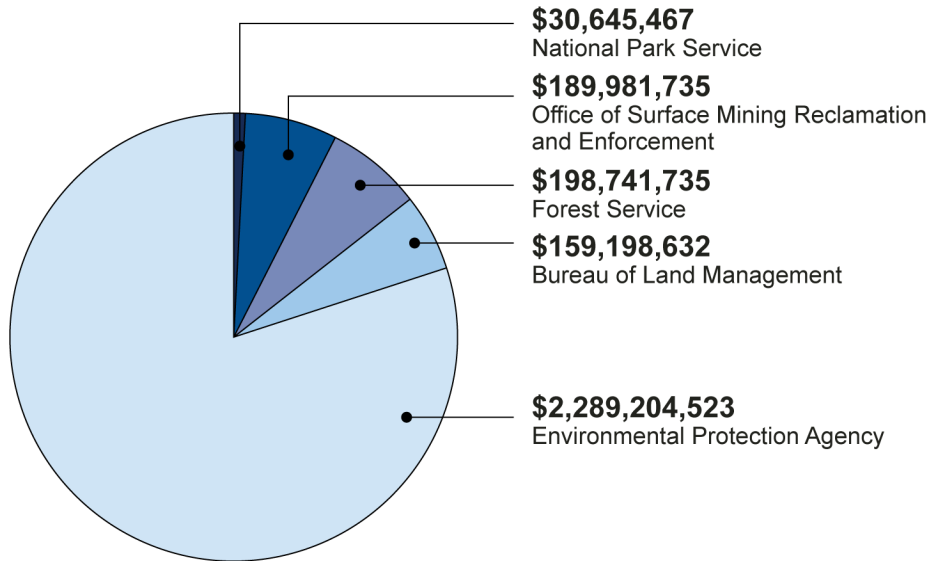
Federal Agencies Spent about \$287 Million Annually from Fiscal Years 2008 through 2017 to Address Abandoned Hardrock Mines, Collaborating with Other Agencies and Stakeholders

Federal agencies spent, on average, about \$287 million annually, or a total of about \$2.9 billion, to identify, clean up, and monitor hazards at abandoned hardrock mines from fiscal years 2008 through 2017. (See fig. 3.) EPA spent 80 percent of the total federal expenditures—about \$2.3 billion—to address environmental hazards. Of the \$2.9 billion in total federal expenditures, approximately \$1 billion was reimbursed by responsible parties.⁴⁵ Appendix II contains additional information about Forest Service, BLM, Park Service, EPA, and OSMRE expenditures by state.

⁴⁴Expenditures reflect nominal dollars.

⁴⁵Under CERCLA, responsible parties are liable for conducting or paying for site cleanup of hazardous substances or for reimbursing others who conduct cleanups on their behalf, including federal agencies. The \$1 billion does not include spending by responsible parties that performed the cleanup work themselves under EPA oversight.

Figure 3: Federal Agency Expenditures to Address Abandoned Hardrock Mines, Fiscal Years 2008 through 2017



Source: GAO analysis of agency information. | GAO-20-238

Notes: Addressing abandoned hardrock mines includes identifying, cleaning up, and monitoring the mines. Expenditures are in nominal dollars and include approximately \$1 billion in reimbursements by responsible parties.

The agencies used some expenditures to address physical safety hazards but used most to address environmental hazards at abandoned hardrock mines.

- **Physical safety hazards.** The Forest Service, BLM, and the Park Service spent a total of over \$105 million from fiscal years 2008 through 2017 to address mine features that posed physical safety hazards. According to officials with these agencies, this included filling in holes and installing gates at tunnels and other mine openings to allow bats, tortoises, and other wildlife to continue accessing important habitat. (See fig. 4.) Officials also said that their expenditures include funds provided to state agencies and others through cooperative funding agreements for projects where the state or other entity managed the work at the sites.

Figure 4: Abandoned Hardrock Mine Tunnel Opening Secured with a Gate to Allow Bat Access on Bureau of Land Management Land in Colorado



Source: GAO. | GAO-20-238

- **Environmental hazards.** From fiscal years 2008 through 2017, the Forest Service, BLM, the Park Service, and EPA spent a total of about \$2.5 billion to address environmental hazards at abandoned hardrock mines. According to agency officials, work at these sites included conducting initial site investigations, designing and implementing remedies to address contamination, operating water treatment facilities, and monitoring completed cleanup actions. The agencies either managed this work themselves or provided funding through cooperative agreements to state agencies or others to manage the work. EPA spent about \$2.3 billion at 394 sites, with about 40 percent

spent at five sites.⁴⁶ Of EPA's total expenditures, \$983 million (43 percent) was reimbursed by responsible parties. In addition, the Forest Service, BLM, and the Park Service spent a total of about \$232 million to address various environmental hazards on lands they manage, of which about \$40 million was reimbursed by responsible parties.⁴⁷

Further, OSMRE reported that 12 states and two Indian tribes spent approximately \$190 million in OSMRE grants to address abandoned hardrock mines and other non-coal sites from fiscal years 2008 through 2017.⁴⁸ OSMRE officials did not specify how much of the \$190 million was spent to address physical safety hazards versus environmental hazards since the agency does not require states and tribes to report such information. Table 2 shows federal agency expenditures by agency and type of hazard.

⁴⁶EPA officials said they reported expenditures associated with all hardrock mine sites, including several contaminated sites with active operations. They explained that the active sites have components that were mined historically and abandoned, and the agency cannot easily distinguish between the contamination caused by historical operations versus contamination caused by more recent operations. They said none of the sites operated entirely after 1990.

⁴⁷BLM recovered \$2.1 million from responsible parties at 13 abandoned hardrock mine sites from fiscal year 2008 through 2017. A BLM official explained that these funds were deposited in Interior's Central Hazardous Materials Fund. Interior uses the fund to pay for work at contaminated sites across the department.

⁴⁸OSMRE officials said the agency categorizes expenditures as either coal or non-coal. Based on OSMRE regional and state agency information, we clarified to the extent possible the amount of non-coal spending that was specific to abandoned hardrock mines. However, the expenditures OSMRE reported include some projects that did not address abandoned hardrock mines. For example, OSMRE officials said that states may have used funds to address hazards at abandoned sand and gravel pits or to build public facilities in communities affected by coal mining.

Table 2: Federal Expenditures to Address Abandoned Hardrock Mines, by Type of Hazard, Fiscal Years 2008 through 2017

Nominal dollars in thousands

Agency	Address physical safety hazards	Address environmental hazards	Address physical safety and environmental hazards (spending was not differentiated by type of hazard)	Total
Bureau of Land Management (BLM)	55,944	52,942 ^a	50,313	159,199
Environmental Protection Agency (EPA)	n/a	2,289,205 ^b	n/a	2,289,205
Forest Service	33,212	164,681 ^c	849	198,742
National Park Service (Park Service)	16,033	14,613 ^d	n/a	30,645
Office of Surface Mining Reclamation and Enforcement (OSMRE)	—	—	189,982	189,982
Total	105,188	2,521,440	241,143	2,867,772

Legend:

— = not available

n/a = not applicable

Source: GAO analysis of agency information. | GAO-20-238

Notes: BLM and Forest Service expenditures include indirect costs, and EPA, Park Service, and OSMRE expenditures include direct costs only. Amounts do not add to totals due to rounding. Physical safety hazards present an immediate danger of injury or death, and environmental hazards pose risks to both human health and the environment.

^aIn addition to these expenditures, BLM reported receiving \$2.1 million in reimbursements from responsible parties at abandoned hardrock mines, but the agency did not identify how much of these funds was spent on abandoned hardrock mines. The collections were deposited into a department-wide fund that is used to address a variety of contaminated sites.

^bThis amount includes \$983 million in reimbursements from responsible parties per settlement agreements and \$21 million in collections from states per cost sharing agreements. It does not include additional expenditures made by responsible parties that performed the cleanup work at sites under EPA oversight.

^cThis amount includes \$38.4 million in reimbursements from responsible parties per settlement agreements.

^dThis amount includes \$1.7 million in reimbursements from responsible parties per settlement agreements. In addition to these expenditures, Park Service officials said the agency collected approximately \$4 million from a responsible party that was deposited into a department-wide fund that is used to address a variety of contaminated sites.

Forest Service, BLM, and Park Service officials we interviewed said they conducted most of their work to address physical safety and environmental hazards at abandoned hardrock mines in collaboration with state agencies, nonfederal stakeholders, and other federal agencies, including EPA. These officials noted that it is important to partner with state agencies and EPA because many of the abandoned mine sites are of mixed ownership and the federal land management agencies generally do not have authority to address mine features on nonfederal lands. Federal agency officials said it is also helpful to pursue partnerships at

mixed ownership sites to leverage limited funding. For example, Forest Service and BLM officials told us that they have partnered with Trout Unlimited, a nongovernmental organization focused on conserving freshwater fisheries and their watersheds, on projects to address environmental hazards at mixed ownership abandoned hardrock mine sites in several western states.

Examples of projects that federal agencies undertook with partners include:

- **Flat Creek-Iron Mountain Mine and Mill, Montana.** Since 2014, the Forest Service has coordinated with EPA and the state of Montana to address contamination from this abandoned mine and mill site on private and Forest Service-managed lands upstream from the town of Superior.⁴⁹ Silver, lead, and other hardrock mining operations left mill tailings piles that contaminated soil, groundwater, and surface water in Flat Creek, which flows for 3.5 miles from the mine site through Forest Service and private lands into the town. The local government and individuals also used tailings as fill material in yards, roadways, and other locations, including the high school track. The Forest Service took the lead on the portion of the site on the land it manages, and EPA and the state took the lead on various nonfederal portions of the site. At the state's request, in 2000, EPA started assessing and cleaning up 79 residential and community properties in Superior; it completed this effort in 2013. In 2017, the state removed mine tailings from the private lands along Flat Creek with EPA oversight. As of November 2019, the Forest Service has been working with Trout Unlimited and the state to remove the mine tailings from the banks of Flat Creek on Forest Service land. Trout Unlimited representatives and Forest Service officials said they are also planning to reconstruct the stream channel and floodplains and restore fisheries habitat in the summer of 2020 after the tailings are removed.
- **Gold Butte National Monument, Nevada.** In 2018, BLM and the Nevada Division of Minerals worked with other federal, state, and local agencies to address 40 features that posed physical safety hazards within the historic Gold Butte Mining District in southern Nevada. The abandoned mine features were within the BLM-managed Gold Butte National Monument, which was established in

⁴⁹The Forest Service, the state, and EPA signed a memorandum of understanding in 2014, under which they agreed to their roles and responsibilities for different portions of the site. EPA started investigating the site in 2000 and included it on the National Priorities List in 2009.

2016. According to project documents, the anticipated increase in recreation as a result of the monument designation prompted BLM and the state to evaluate the area for potential physical safety hazards. The 40 abandoned mine features included horizontal mine tunnel openings and deep vertical openings. BLM and the Nevada Division of Wildlife conducted cultural and wildlife surveys, respectively, to help determine appropriate closure methods. The state then filled the hazardous openings with foam and rock or installed gates that provide access to bats and desert tortoises. The local county government also contributed to the installation of the bat gates.

Agencies in 13 States Estimated Spending a Total of about \$117 Million of Nonfederal Funds from Fiscal Years 2008 through 2017 to Address Abandoned Hardrock Mines

Officials from the 13 states in our review estimated spending about \$117 million in total, or an average of nearly \$12 million annually, of nonfederal funds from fiscal years 2008 through 2017 to address physical safety and environmental hazards at abandoned hardrock mines within their states.⁵⁰ Spending in three of the 13 states—California, Colorado, and Idaho—represented over 86 percent of the total nonfederal expenditures. Of the approximately \$117 million, states spent about \$26 million addressing physical safety hazards and about \$91 million addressing environmental hazards. (See table 3.)

Table 3: Estimated State Expenditures of Nonfederal Funds to Address Abandoned Hardrock Mines, by State and Type of Hazard, Fiscal Years 2008 through 2017

Nominal dollars in thousands

State	Address physical safety hazards	Address environmental hazards	Total
Alaska	0	107	107
Arizona	1,235	0	1,235
California	16,144	24,066	40,210
Colorado	4,160	28,129	32,289
Idaho	1,080	26,567	27,647

⁵⁰The 13 states reported expenditures by their state fiscal years, which are from July 1 through June 30.

State	Address physical safety hazards	Address environmental hazards	Total
Montana	209	1,884	2,094
Nevada	2,203	860 ^a	3,063
New Mexico	0	4,273 ^p	4,273
Oregon	27	515	543
South Dakota	0	0	0
Utah	754	47	801
Washington	200	4,176 ^a	4,376
Wyoming	0	0	0
Total	26,011	90,626	116,637

Source: GAO analysis of state agency information. | GAO-20-238

Notes: Expenditures are by state fiscal year, which is from July 1 through June 30 for the 13 states. Amounts in rows do not equal totals due to rounding. Nonfederal funds do not include funds that federal agencies provided to states through grants and other funding agreements. South Dakota and Wyoming did not receive nonfederal funds to spend addressing abandoned hardrock mines during the 10-year period, according to state officials. Physical safety hazards present an immediate danger of injury or death, and environmental hazards pose risks to both human health and the environment.

^aExpenditures were reimbursed by responsible parties.

^bAmount includes \$3.8 million that was reimbursed by responsible parties.

State officials said that the sources of nonfederal funds that the states spent to address abandoned hardrock mines included (1) state-generated funds and (2) funding from settlements with responsible parties.⁵¹

- State-generated funds.** Officials from eight of the 13 states reported that they expended revenue raised by the state government to work on abandoned hardrock mines. Revenue sources include mine license taxes and royalties on oil and gas, hardrock mines, and other mineral extraction, and other sources such as the state general fund. For example, officials from the California Department of Conservation said the agency spent funds generated by state fees on active gold and silver operations to address physical safety hazards at abandoned mines on public lands.⁵² In addition, Colorado officials

⁵¹In addition, one state spent funds that a mining company voluntarily contributed to address environmental hazards at abandoned hardrock mines for which the company is not a responsible party. Specifically, Colorado officials said they spent about \$1.6 million received from the company over the 10 years to address environmental hazards at abandoned mines in the same counties as the company's current operations.

⁵²California assesses fees on active gold and silver mining operations and uses them to fund reclamation of abandoned mines. Cal. Pub. Res. Code § 2207(d)(4)(b)(i). In addition, the state receives a portion of royalties generated, and other funds received, from geothermal and oil and gas leases on federal land in California, pursuant to the Mineral Land Leasing Act, as amended. 30 U.S.C. § 191(a). The federal government collects these funds and disburses a portion to the state.

said they spent funds from a state severance tax collected on oil and gas, coal, metallic minerals, and other mineral production to address physical safety and environmental hazards.

- **Settlements with responsible parties.** Officials from five of the 13 states reported that they spent funds received from settlements with responsible parties to either conduct cleanup actions or oversee the responsible parties' work to address environmental hazards. For example, from fiscal years 2008 through 2017, the state of New Mexico spent over \$3.8 million that it had collected from responsible parties at two abandoned hardrock mine sites, according to state documents. Nevada and Washington officials said that their agencies' expenditures to address environmental hazards during the 10-year period were entirely funded by collections from responsible parties.

State officials we interviewed said they spent these nonfederal funds to address abandoned hardrock mines located primarily on private, county, state, or other nonfederal lands, including at mixed ownership sites. Officials from two of the 13 states (Colorado and Nevada) said they also spent state-generated funding to address hazards on federal land. Officials from the Nevada Division of Minerals' abandoned mine program said that they generally spend about 80 to 90 percent of the program's nonfederal funding addressing physical safety hazards on federal land.⁵³ These officials explained that fees from unpatented mining claims on federal land are the division's main funding source and, therefore, the state spends most of this funding to address hazards on federal land.

Officials with the 13 states also told us that, in addition to spending about \$117 million in nonfederal funds over the 10 years, states also spent more than \$440 million they received from federal agencies, primarily through grants and cooperative agreements, during this period.⁵⁴ Officials

⁵³According to Nevada officials, for every unpatented mining claim filed on federal land, Nevada counties collect a \$4 fee and remit it to the Division of Minerals' abandoned mine program. This fee is in addition to federal fees associated with mining claim filings. The state also collects a one-time per-acre fee for all permitted disturbances associated with new or amended mine or exploration plans of operation on public lands administered by a federal agency.

⁵⁴State officials said that their programs received funds from OSMRE, BLM, the Forest Service, and EPA during this time period. Based on the states' expenditure information, in particular reports of their OSMRE grant spending, and information from federal agencies, it appears that most of the approximately \$440 million likely is included in the \$2.9 billion federal agencies reported spending from fiscal years 2008 through 2017, discussed above.

with seven states reported that they receive significantly more federal funds than nonfederal funds to work on abandoned hardrock mines and that federal funding is critical to addressing hazards at these mines.

Federal Agencies Estimated Billions More Would Be Needed to Address Abandoned Hardrock Mine Hazards

The Forest Service, BLM, the Park Service, and EPA estimated that their future costs to inventory and address physical safety and environmental hazards at abandoned hardrock mines would be in the billions of dollars.⁵⁵ Each agency has generated some information about estimated future costs using a variety of methods and covering a range of activities. Given the level of uncertainty associated with the estimates, they likely understate the amounts that will be needed to comprehensively inventory and address these hazards.

Estimated Costs to Inventory

The Forest Service and BLM estimated that it could cost over \$650 million to finish inventorying abandoned hardrock mines on lands they manage. Specifically, Forest Service information indicated it could cost about \$147 million to complete the agency's inventory, which includes identifying potential environmental hazards at 15,247 sites as well as the locations and conditions at approximately 13,000 sites not currently captured in a database.⁵⁶ In addition, BLM officials estimated that it would cost about \$510 million to complete the agency's inventory of abandoned hardrock mines. This estimate includes about \$130 million to evaluate approximately 66,000 features identified as posing an unconfirmed

⁵⁵OSMRE officials said the agency has not estimated future costs for addressing abandoned hardrock mines because the agency's abandoned mine program is focused on addressing abandoned coal mines.

⁵⁶Forest Service officials said they estimated in 2017 that it would cost about \$203 million to inventory all 39,000 abandoned mines originally estimated to be on Forest Service land at a cost of \$5,200 per site, which includes visiting the site and conducting land ownership surveys. Since the 39,000 mines include non-hardrock abandoned mines and mines the Forest Service already inventoried, we applied the agency's cost assumption of \$5,200 per site to sites that need to be inventoried, including those with unconfirmed environmental hazards and sites not yet in a database.

physical safety or environmental hazard.⁵⁷ It also includes another \$380 million to confirm the locations and presence of hazards at the approximately 380,000 additional features that may be on BLM-managed land but are not in its database.⁵⁸

The Park Service and EPA did not provide estimates for future inventory work. Park Service officials said they have not estimated costs for additional inventory work because they believe that their inventory is largely comprehensive. EPA officials explained that the agency does not manage lands so they do not work to identify the existence of contaminated abandoned mines. Rather, EPA relies on external sources, such as state agencies and local governments, to alert it of potentially contaminated sites on nonfederal lands that may need attention.

Estimated Costs to Address Physical Safety Hazards

BLM and the Park Service estimated it could cost nearly \$5 billion to address the physical safety hazards at abandoned hardrock mines on the lands they manage, and the Forest Service has not estimated this amount. Specifically, BLM estimated it could cost about \$4.7 billion to fill in, gate, or otherwise address the nearly 65,000 features it has identified with confirmed and unconfirmed physical safety hazards and the estimated 380,000 additional features that are not yet included in the agency's database.⁵⁹ Park Service officials said they estimated that it would cost about \$86 million to address the physical safety hazards at the abandoned hardrock mines identified in the agency's database.⁶⁰ These officials said that they plan to revise this estimate once they have better information about the actual costs to close the features where they are currently working.

⁵⁷BLM used state-specific average costs per site to estimate the costs to validate the presence of physical safety and environmental hazards at more than 66,000 features. See Bureau of Land Management, *Abandoned Mine Lands Program: Feasibility Study for AML Inventory Validation and Physical Safety Closures* (July 2013).

⁵⁸BLM's estimates are based on state-specific average costs per site to validate the presence of physical safety and environmental hazards.

⁵⁹BLM's estimates are based on state-specific average costs to address physical safety hazards.

⁶⁰The Park Service used an estimated cost per closure to create its estimate for physical safety work at abandoned hardrock mines. Officials said the estimate is limited to direct costs.

The Forest Service and EPA did not have estimates for addressing physical safety hazards. The Forest Service has not comprehensively estimated these costs, although the individual forests identify priority projects for spending each year, according to agency officials. EPA has not separately estimated costs to address physical safety hazards since those costs are included in its estimates to address environmental hazards.

Estimated Costs to Address Environmental Hazards

The Forest Service, BLM, the Park Service, and EPA have partly estimated costs to address environmental hazards at abandoned hardrock mines. Agency officials said that they do not have comprehensive estimates, in part because they have not yet selected the cleanup remedy at numerous sites—information they need to develop detailed estimates—nor have they identified all of the contaminated sites that will need to be addressed. The officials explained that a remedy to address an abandoned mine site with one waste rock pile (e.g., removing the pile from a creek and constructing a repository for it) is different from a remedy needed to address a site with perpetually draining mine tunnels, which could include operating and maintaining water treatment systems over the long term. As a result, the costs of cleanup remedies can vary from hundreds of thousands to hundreds of millions of dollars per site. Estimates of future costs to address environmental hazards at abandoned hardrock mines and what the estimates included varied by agency:

- **Forest Service.** Forest Service and USDA officials said that they estimated in 2014 that it could cost about \$6 billion to address environmental hazards at 6,600 abandoned hardrock mine sites on Forest Service-managed land.⁶¹ This estimate includes costs to assess the extent of contamination, search for responsible parties, design and implement an action to remove a small waste rock or tailings pile, and monitor and maintain each site for 30 years after the cleanup is complete. According to the estimate, costs to maintain the completed sites make up half of the \$6 billion in estimated future costs. These officials also said they assumed that all 6,600 sites are relatively simple and not complex with more extensive contamination.

⁶¹The Forest Service assumed that 20 percent of approximately 33,000 sites, or 6,600 sites, would require action to mitigate environmental hazards. The agency then used average costs per site to generate its estimate and did not evaluate each site to determine the specific actions that would be needed. Forest Service officials said they consider this estimate to be current as of 2019.

In developing this estimate, the Forest Service did not assume that responsible parties would cover any of these costs.

- **BLM.** BLM estimated a portion of the costs associated with addressing environmental hazards at abandoned hardrock mines on BLM-managed land, since BLM officials said there are too many unknowns and unique circumstances at each feature to comprehensively estimate total costs. These officials said the agency has estimated costs for some sites with confirmed environmental hazards in accordance with Interior's environmental liabilities reporting guidance.⁶² Specifically, as of June 2019, BLM estimated that future costs to address environmental hazards at 105 abandoned hardrock mine sites on BLM-managed land range from \$61 million to about \$265 million. Interior and BLM officials explained that these costs do not represent all future costs needed to clean up these sites. Instead, the range includes the future costs that the agency determines are reasonably estimable at the time for these sites. In some cases, these costs are limited to the cost of conducting a study if the agency has not selected a cleanup remedy. As a result, officials said they expect that BLM's estimate of total future costs will increase once the agency selects the cleanup remedies and estimates their costs. Officials also said they have not estimated future costs for sites where the agency has not determined the type or extent of the contamination or where BLM is not likely to fund the cleanup, for example, because a responsible party may pay for it.
- **Park Service.** Similar to BLM, Park Service officials estimated the future costs associated with addressing environmental hazards at 50 contaminated abandoned hardrock mines, based on Interior's guidance. As of June 2019, the Park Service estimated that these future costs range from \$21 million to \$35 million, exclusive of any reimbursements from responsible parties. The Park Service did not estimate the future costs to address 19 additional sites that the

⁶²According to Interior's handbook for identifying and reporting environmental liabilities, an environmental and disposal liability is an anticipated future outflow of resources where study or cleanup is warranted. A government acknowledged financial responsibility occurs when the department (or its bureaus) did not cause or contribute to contamination at a site and it is not otherwise liable for the cleanup costs under law or statute, but the bureau chooses to accept financial responsibility to protect public health, welfare, or the environment. The handbook states that bureaus are required to report environmental liabilities for abandoned mines to the department once contamination is confirmed and a future outflow of resources is expected beyond existing maintenance or infrastructure funds. Department of the Interior, *Environmental and Disposal Liabilities Identification, Documentation and Reporting Handbook v 3.0* (Washington, D.C.: December 2011).

agency identified as posing environmental hazards because either work at these sites is in the early stages, the agency was unable to estimate costs, or the Park Service is not likely to fund the cleanup, according to Park Service and Interior officials.

- **EPA.** EPA officials told us that they do not have a comprehensive estimate of costs to clean up hardrock mines. Specifically, officials said EPA tracks planned obligations to be incurred for sites where the agency anticipates taking action within the next 3 years to help support its budget development process. As of fiscal year 2018, EPA identified about \$519 million in planned obligations for 115 hardrock mine or mineral processing sites.⁶³ EPA officials said the planned obligations do not necessarily reflect the total estimated costs remaining at a site because the agency typically requires its regions to report known planned obligations for 3 years, or longer, if available. According to EPA data, future costs to address hardrock mines likely will exceed these obligations. For example, EPA did not report planned obligations for 423 mine and mineral processing sites where the agency has not completed site assessment work or selected a cleanup remedy. According to EPA officials, they generally do not plan obligations for future cleanup work while conducting an assessment. However, they said that if an assessment reveals a need for a time-sensitive response at a site, the agency may fund it. EPA officials also told us that they expect responsible parties to pay a portion of the future costs associated with these sites, but that amount is unknown.

Federal and State Agencies and Stakeholders Cited Availability of Resources and Legal Liability Concerns as Factors That Limit Efforts to Address Abandoned Hardrock Mines

Federal agency officials, state officials from three selected states (Colorado, Montana, and Nevada), and stakeholders cited availability of resources and legal liability concerns as factors that limit efforts to identify, clean up, and monitor hazards at abandoned hardrock mines. Federal and state officials said their backlog of work on abandoned mines is greater than current staff and budget levels. In addition, state agency

⁶³According to EPA officials, the actions on which the planned obligations are based may change as site conditions, resources, contractual and enforcement considerations, and other factors are evaluated.

officials and other stakeholders we interviewed, such as nongovernmental organizations and mining companies, have limited their participation in projects to address environmental hazards at abandoned mines because of concerns about their potential legal liability under CERCLA and the Clean Water Act.

Federal and State Officials Cited Availability of Resources as a Limiting Factor

All of the officials we interviewed from the Forest Service, BLM, the Park Service, and EPA, as well as from Colorado, Montana, and Nevada, cited availability of resources as a factor that limits their efforts to identify and address the physical safety and environmental hazards at abandoned hardrock mines. Representatives from state associations and nongovernmental organizations we interviewed also cited this factor as limiting federal and state efforts. Federal and state officials said that their backlog of work on these mines far exceeds their current staff and budget levels. For example, BLM officials estimated that with the agency's current abandoned mine budget and staff resources, it could take up to 500 years to confirm the presence of physical safety or environmental hazards at the approximately 66,000 features in its database and the estimated 380,000 features not yet captured in its database.⁶⁴

Officials from Colorado and Montana and representatives from a state association noted that these two states regularly receive reclamation funding from OSMRE to address abandoned coal mines in their states. As a result of having access to such funds, five states, including Montana and Wyoming, as well as three tribes have certified that they have addressed all of their known priority abandoned coal mines.⁶⁵ These officials also noted that there is not a similar or consistent source of funding for states to address hazards at abandoned hardrock mines. In

⁶⁴BLM assumed staff could validate 35 features each week with current resources. See also Bureau of Land Management, *Abandoned Mine Land Inventory Study for BLM-Managed Lands in California, Nevada, and Utah: Site and Feature Analysis*, BLM/OC/ST-15/001+3720 (Denver, CO: November 2014). BLM officials said the agency could improve efficiency and complete its inventory in less time with additional strategic planning resources and the use of technology such as remote sensing.

⁶⁵A state or tribe may certify to the Secretary of the Interior that it has completed reclamation of all known priority safety hazards at eligible abandoned coal mines and coal mining-affected sites within its jurisdiction. The Secretary reviews the certification and concurs if the Secretary determines, after public notice and comment, that the certification is correct. 30 U.S.C. § 1240a(a).

Nevada, although state-collected mining fees contribute to addressing safety hazards at abandoned hardrock mines, state officials said they do not have a consistent source of funding to address environmental hazards. As a result, Nevada officials explained that they tend to work primarily on mines where there is a viable responsible party to fund the cleanup. However, one official said that most of the approximately 190 abandoned hardrock mine sites in the state that pose or may pose environmental hazards do not have a viable responsible party.

Federal and state agency officials described several steps they have taken to work more efficiently within existing limited resources. For example, federal agency officials said they prioritize proposed projects to address abandoned mines that pose the highest safety and environmental risks. In addition, federal officials explained that they have established several formal mechanisms for national and local collaboration to facilitate leveraging resources. For instance, federal and state officials working in Colorado said they formed a working group in 2010 to jointly identify and prioritize watersheds that have been contaminated by abandoned hardrock mines. The agencies work collaboratively to evaluate the extent of contamination in each watershed, leading to a more holistic approach to addressing contamination, according to EPA and Colorado state officials. Regional Forest Service officials we interviewed who also work outside of Colorado said the group is a national model for collaboration and efficient use of resources.

Forest Service, BLM, Park Service, EPA, and state officials also said that they work to leverage federal and state resources by searching for responsible parties to contribute funding to their efforts at abandoned hardrock mines. However, officials told us that identifying such parties is difficult and can be resource intensive given the length of time that has elapsed since the mines were abandoned and the lack of a clear chain of custody and land ownership boundaries at mine sites.

State Officials and Stakeholders Cited Legal Liability Concerns as a Limiting Factor

All of the state officials and nearly all of the stakeholders from nongovernmental organizations, state associations, and industry we interviewed cited concerns over legal liability—that is, being held legally responsible for addressing environmental contamination—as a factor that limits efforts to address certain abandoned hardrock mine hazards on nonfederal land. Specifically, liability concerns can prevent third parties—

entities who offer assistance in addressing environmental hazards that they did not create and are not legally required to clean up—from taking actions to help address such hazards that are on private land and on nonfederal portions of mixed ownership sites. These parties are often referred to as Good Samaritans and may include state agencies, nongovernmental organizations, local governments, private landowners, and mining companies, among others.⁶⁶

Federal and state officials and stakeholders we interviewed said that Good Samaritans have avoided taking certain cleanup actions—in particular, addressing mine tunnels that perpetually drain highly contaminated water—at abandoned hardrock mines because they are concerned about potentially being held legally responsible under CERCLA and the Clean Water Act. Specifically, a Good Samaritan undertaking cleanup actions at an abandoned hardrock mine might become a responsible party under CERCLA and thereby would be responsible for the entire cost of cleaning up the site.⁶⁷ As a result, representatives from an industry association and a nongovernmental organization told us that while they are interested in addressing contamination on private land in the West, they generally have not done so, in part because of concerns about becoming responsible under CERCLA for cleaning up all of the contamination present at the site.

In addition, a Good Samaritan undertaking cleanup actions to address draining mine tunnels may be required to do so in accordance with a discharge permit under the Clean Water Act.⁶⁸ Complying with such a permit requires that the cleanup meet and maintain water quality

⁶⁶Officials and stakeholders generally agree that a mine operator that is already a responsible party under CERCLA at a site would not be considered a Good Samaritan for that site.

⁶⁷Courts have interpreted the liability of responsible parties under CERCLA to be strict, joint and several, and retroactive. Under strict or “no fault” liability, a party may be liable for cleanup even though its actions were not considered improper when it disposed of the wastes. Under joint and several liability, when the harm done is indivisible, one party can be held responsible for the full cost of the remedy even though that party may have disposed of only a portion of the hazardous substances at the site. Under retroactive liability, parties can be held responsible for actions that took place before CERCLA was enacted.

⁶⁸The Clean Water Act generally prohibits the discharge of pollutants into waters of the United States without a permit. 33 U.S.C. § 1311(a). Actions taken to manage water draining from a mine could result in discharges covered by the Clean Water Act, necessitating a permit.

standards, which can be expensive and may require perpetual water treatment. State officials and stakeholders explained that meeting and maintaining such standards at certain mines is difficult because of naturally occurring heavy metals and continual drainage from the mines. They said they are interested in undertaking smaller-scale projects to address mine tunnel drainage that may significantly improve water quality and aquatic habitat but would not fully meet water quality standards. However, Colorado and Montana state officials and various stakeholders said they generally decide not to undertake such projects, even if they could make incremental improvements, because of the risk of being held responsible for meeting and maintaining water quality standards in perpetuity.⁶⁹

To encourage nongovernmental organizations, other stakeholders, and states to participate in abandoned hardrock mine projects at mixed ownership sites and on other private land, EPA developed administrative tools aimed at limiting Good Samaritans' CERCLA and Clean Water Act liability. In 2007, EPA developed guidance for issuing "comfort/status letters" to Good Samaritans willing to perform cleanup work under EPA oversight and for entering into settlement agreements—legally enforceable documents signed by EPA and a Good Samaritan that include a federal covenant not to sue under CERCLA in exchange for cleanup work.⁷⁰ In 2012, EPA also issued guidance stating that, as a general matter, the agency would not require a Good Samaritan to obtain a Clean Water Act discharge permit if they successfully complete a

⁶⁹To help protect water quality from the adverse impacts of mining, as of 2019, Colorado generally requires that plans for new or amended reclamation permits for mining operations demonstrate a reasonably foreseeable end date for any water quality treatment necessary to ensure compliance with applicable water quality standards. Colo. Rev. Stat. Ann. § 34-32-116(g)(II).

⁷⁰Environmental Protection Agency, *Interim Guiding Principles for Good Samaritan Projects at Orphan Mine Sites and Transmittal of CERCLA Administrative Tools for Good Samaritans* (June 6, 2007). EPA made technical revisions to the model comfort/status letter on August 25, 2015. Within the settlement agreements, the United States reserves the right to sue a Good Samaritan in limited cases, such as negligence or criminal violations.

cleanup action under a comfort/status letter or settlement agreement with EPA.⁷¹

Good Samaritans have participated in some projects at abandoned hardrock mines using EPA's administrative tools. As of January 2020, EPA had issued four comfort letters and entered into three settlement agreements, generally to address hazards at sites that did not require a Clean Water Act permit. Some state officials and stakeholders we interviewed said they have not pursued using EPA's administrative tools because, in part, these tools do not sufficiently alleviate liability under the Clean Water Act. For example, they explained that the tools and guidance provide reassurance that EPA may not sue the Good Samaritan but do not ensure that certain outside parties will not sue to require they meet water quality standards.⁷²

State officials and stakeholders we spoke with said that they believe that resolving the concerns over CERCLA and Clean Water Act liability may require federal legislation. However, other stakeholders expressed concerns that legislative changes, such as amending CERCLA or the Clean Water Act, could inadvertently result in weakening the existing environmental protections in these and other laws or could limit the ability of outside parties to enforce their provisions. Since 1999, several bills have been introduced that would have responded to liability concerns but as of December 2019, none had been enacted.⁷³ State officials and stakeholders have been involved in efforts to draft legislation that would

⁷¹The guidance outlines the circumstances under which a Good Samaritan that completes a cleanup action under an administrative tool would not be required to obtain a discharge permit, including that the Good Samaritan will not perform additional work at the site after cleanup is complete. Environmental Protection Agency, *Clean Water Act § 402 National Pollutant Discharge Elimination System Permit Requirements for "Good Samaritans" at Orphan Mine Sites* (Dec. 12, 2012).

⁷²The Clean Water Act allows outside parties with an interest that is adversely affected to sue any person, group, or government entity if they are alleged to be in violation of Clean Water Act standards, subject to some limitations. 33 U.S.C. § 1365.

⁷³See, for example, Good Samaritan Abandoned or Inactive Mine Waste Remediation Act, S. 1787, 106th Cong. (1999); Good Samaritan Abandoned and Inactive Mine Remediation Act, S. 1660, 108th Cong. (2003); Abandoned Hardrock Mines Reclamation Facilitation Act, H.R. 1266, 109th Cong. (2005); Cleanup of Inactive and Abandoned Mines Act, S. 1848, 109th Cong. (2005); Good Samaritan Clean Watershed Act, S. 2780 and H.R. 5404, 109th Cong. (2006); Title III of the Locatable Minerals Claim Location and Maintenance Fees Act of 2015, H.R. 3843, 114th Cong. (2015); Hardrock Mining Reform and Reclamation Act of 2015, H.R. 963, 114th Cong. (2015); Good Samaritan Remediation of Orphan Hardrock Mines Act of 2018, S. 3727 and H.R. 7226, 115th Cong. (2018).

address liability concerns, but the interested parties have disagreed about the specific provisions to include.⁷⁴

While federal agency officials did not cite liability concerns as a factor that limits their agencies' efforts to address abandoned hardrock mines on lands under their jurisdictions, Forest Service, BLM, and EPA officials concurred that legal liability concerns deter Good Samaritans from participating in projects with federal agencies at mixed ownership sites. Federal officials explained that, unlike Good Samaritans, the abandoned hardrock mines the federal agencies address are under their jurisdiction and the agencies are already responsible for meeting the requirements of CERCLA and other applicable laws. However, federal agency officials have observed the effects of Good Samaritan legal liability concerns on projects. For example, Forest Service officials in Colorado said that potential partners have expressed interest in addressing contamination on the private land portions of mixed ownership sites but declined once they learned they would be subject to liability under CERCLA.

In the absence of legislative changes, EPA officials said they are looking for new ways to encourage Good Samaritan participation in abandoned hardrock mine projects. For example, they are working to update and refine the agency's administrative tools and identify new solutions to better address Good Samaritans' concerns. They are also looking to encourage Good Samaritan participation in more projects that would not require a Clean Water Act permit, such as moving mine tailings piles away from streams.

Agency Comments

We provided a draft of this report to the Department of Agriculture, the Department of the Interior, and EPA for their review and comment. The Forest Service Audit Liaison provided comments by email, stating that the Forest Service generally agreed with the report. USDA and EPA provided technical comments, which we incorporated as appropriate. Interior told us they had no comments.

⁷⁴For example, members of Congress opposed to a 2015 House bill containing Good Samaritan provisions noted: "Only sites that are truly abandoned, and for which there are no potentially responsible parties, should be eligible for [Good Samaritan] permits. Allowing current mine site owners to become Good Samaritans is also potentially problematic because of the limited number of safeguards against re-mining at sites with Good Samaritan permits." H.R. Rep. No. 114-717 at 26 (dissenting views) (2016).

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the appropriate congressional committees, the Secretaries of Agriculture and the Interior, the Administrator of EPA, and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or fennella@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.

Sincerely yours,



Anne-Marie Fennell
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

This report describes (1) what is known about the number of abandoned hardrock mines in the United States; (2) federal and state agency expenditures to address abandoned hardrock mines from fiscal years 2008 through 2017, and what is known about future costs to address these mines; and (3) factors that limit federal and state agencies' and stakeholders' efforts to address abandoned hardrock mines.

To address these objectives, we reviewed our previous work on abandoned hardrock mines, including a March 2008 report in which we summarized information about the number of abandoned hardrock mines in the United States and the amount of federal spending on these mines from fiscal years 1998 through 2007.¹ We also reviewed federal agency reports to identify the federal agencies that track numbers of abandoned hardrock mines, conduct work to address hazards at these mines, or fund projects to address these hazards. We identified the U.S. Department of Agriculture's (USDA) Forest Service; the Department of the Interior's Bureau of Land Management (BLM), National Park Service (Park Service), and Office of Surface Mining Reclamation and Enforcement (OSMRE); and the Environmental Protection Agency (EPA) to include in our review. We reviewed agency documents detailing these agencies' cleanup efforts and abandoned hardrock mine programs.

We also selected 13 western states to include in our review: Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington, and Wyoming. We selected these states because our March 2008 report and other federal and state agency reports indicated that most of the abandoned hardrock mines are in these states.² We conducted two site visits to abandoned hardrock mines in Colorado in February 2019. We selected sites in Colorado because they provided opportunities to observe examples of physical

¹For example, see GAO, *Hardrock Mining: Information on Abandoned Mines and Value and Coverage of Financial Assurances on BLM Land*, [GAO-08-574T](#) (Washington, D.C.: Mar. 12, 2008); and *Hazardous Waste: Agencies Should Take Steps to Improve Information on USDA's and Interior's Potentially Contaminated Sites*, [GAO-15-35](#) (Washington, D.C.: Jan. 16, 2015).

²[GAO-08-574T](#).

safety and environmental hazards on federal and nonfederal lands. We visited sites with physical safety hazards that BLM and the state had addressed on BLM and county lands. We also visited a National Priorities List site where EPA and the state were addressing environmental hazards on private land.

To describe what is known about the number of abandoned hardrock mines in the United States, we obtained and summarized information about abandoned hardrock mine features and sites—including the number of features and sites that pose confirmed and unconfirmed physical safety and environmental hazards—that the Forest Service, BLM, the Park Service, and EPA maintained in databases as of May 2019, the most current at the time of our review.³ Specifically:

- the Forest Service provided information about abandoned hardrock mine sites from USDA’s National Environmental Accomplishment Tracking system;⁴
- BLM provided information about abandoned hardrock mine features from the Abandoned Mines and Site Cleanup Module;
- the Park Service provided information about abandoned hardrock mine sites and features from the Abandoned Mineral Lands Data Entry and Edit database and from Interior’s Environmental and Disposal Liabilities list; and
- EPA provided information about hardrock mining and mineral processing sites from its Superfund Enterprise Management System.

In addition, we obtained information on the agencies’ estimates of the number of additional abandoned hardrock mine sites or features that are not captured in their databases, where applicable.

We assessed the reliability of the agencies’ databases by testing the data for accuracy by cross-referencing with relevant data sets and checking for missing data and errors. We also reviewed agency documents about the databases and our previous related work regarding the use of these data.⁵ We also interviewed headquarters officials from each agency and

³OSMRE does not centrally collect information about abandoned hardrock mines.

⁴The Forest Service did not provide information about abandoned hardrock mine sites or features with physical safety hazards since the agency does not track that information at headquarters.

⁵See [GAO-15-35](#).

discussed the data and any limitations. We determined that the information in the agencies' databases about the number of abandoned hardrock mines was sufficiently reliable to summarize in our report.

We calculated the agencies' total number of abandoned hardrock mines in terms of the number of features. According to agency officials, many abandoned hardrock mine sites contain more than one feature, but there is no agreed-upon average number of features per site. Since the Forest Service and EPA reported information only by mine site, we counted the minimum of one feature per site in our calculations. As a result, the total number of features likely is underestimated.

Further, we collected information about the number of abandoned hardrock mines in the 13 western states through semi-structured interviews with state officials. For each state, we interviewed officials with the relevant state agencies that address abandoned hardrock mines through, for example, a dedicated abandoned mine program or a broader program focused on addressing environmental hazards. In each interview, we asked the officials to provide information about the numbers of abandoned hardrock mine sites they identified in their state, features that posed a hazard to public health and safety, and features that caused environmental degradation as of the time of our review. We provided the states with a common definition of abandoned mine site and feature. However, officials with five states provided information only for abandoned mine sites and not features. For those states, we counted the minimum of one feature per site to calculate the states' total number of abandoned hardrock mine features. As a result, the states' total number of features likely is underestimated. We assessed the reliability of the states' information by reviewing documents about the data systems, checking for missing data and errors, and discussing the data and their sources with state officials, including any limitations. We determined that the data were sufficiently reliable to describe what the state agencies know about abandoned hardrock mines within their jurisdictions.

To describe federal agency expenditures to address abandoned hardrock mines from fiscal years 2008 through 2017, we summarized expenditure information from the Forest Service, BLM, the Park Service, EPA, and OSMRE for this time period, the most recent 10 years of information available at the time of our review.⁶ Specifically, we collected information

⁶In this report, we use the word spent to mean agency expenditures. An expenditure is an actual spending of funds, an outlay.

about total expenditures to address abandoned hardrock mines, expenditures to address physical safety hazards, expenditures to address environmental hazards, and expenditures of collections from responsible parties under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as applicable. We assessed the reliability of the agencies' information by testing the data for accuracy and completeness by checking for missing data and errors. We also reviewed our previous related work regarding the use of the information and interviewed agency officials involved with collecting or analyzing the information. We determined that the information obtained from the agencies was sufficiently reliable for our descriptive purposes. Additional details on agency-specific information we used follows:

- **Forest Service.** The Forest Service provided expenditure information for fiscal years 2008 through 2017 for its Abandoned Mine Land and Environmental Compliance and Protection programs from its Foundation Financial Information System. The Forest Service also provided information from this system about expenditures of reimbursements from responsible parties. USDA provided information about the Forest Service's expenditures from the department's Hazardous Materials Management Account for fiscal years 2008 through 2017 from the Financial Management Modernization Initiative system.
- **BLM.** BLM provided expenditure information from Interior's Financial Business Management System for fiscal years 2009 through 2017. BLM's budget office provided expenditure information for fiscal year 2008 since information prior to fiscal year 2009 is not included in Interior's current financial system. BLM provided information about abandoned hardrock mine expenditures from relevant subactivity codes, including Abandoned Mine Lands, Hazardous Materials Management, American Recovery and Reinvestment Act-Abandoned Mine Land projects, and Central Hazardous Materials Fund, among others.
- **Park Service.** The Park Service provided expenditure information from Interior's Financial Business Management System and the Park Service's Project Management Information System and Administrative Financial Systems 3 and 4 for fiscal years 2008 through 2017 for its Abandoned Mine Lands program and the Contaminants Cleanup Branch. The Park Service also provided information from Interior's system about expenditures of reimbursements from responsible parties.

- **OSMRE.** OSMRE provided expenditure information from Interior's Financial Business Management System for fiscal years 2008 through 2017 from its non-coal account, which includes spending for projects to address abandoned hardrock mines, non-hardrock abandoned mines, and other eligible projects. To further narrow the non-coal account expenditures to spending on abandoned hardrock mines, we reviewed information for projects that states completed during the 10-year period and eliminated expenditures that were clearly identified for non-hardrock-related projects. We also compared the expenditure information from OSMRE with expenditure information we obtained during our semi-structured interviews with officials from six state agencies that reported spending OSMRE grants specifically on hardrock abandoned mines—Alaska, Colorado, New Mexico, Montana, Utah, and Wyoming. We determined that Alaska's and Colorado's reported expenditures were more specific to abandoned hardrock mines than the information OSMRE provided for those states. As a result, we used Alaska's and Colorado's information to report expenditures for those states and used OSMRE's information to report expenditures for all other states. OSMRE officials agreed with this approach.
- **EPA.** EPA provided information about the Superfund program's expenditures at mine and mineral processing sites from the Integrated Financial Management System for fiscal years 2008 through 2011 and the Compass Financial System for fiscal years 2012 through 2017. EPA provided expenditures from its (1) Superfund appropriation accounts, (2) special accounts through which EPA receives resources from settlements with responsible parties for EPA to conduct site-specific work, and (3) state cost-share accounts, through which states contribute 10 percent of costs for EPA's Superfund-financed remedial actions. EPA also reported expenditures of funds provided by other federal agencies; we excluded these expenditures from our reporting of EPA's spending to avoid potential double counting.

Further, we obtained information through our semi-structured interviews with officials from the 13 selected states about their expenditures of nonfederal and federal funds at abandoned hardrock mines for state fiscal years 2008 through 2017. We obtained and summarized information on total expenditures to address abandoned hardrock mines, expenditures to address physical safety hazards, and expenditures to address environmental degradation. We also obtained information about the sources of the agencies' funding, such as collections from responsible parties. The states provided expenditure information by state fiscal year

and not federal fiscal year because their financial systems are organized by state fiscal year.

We assessed the reliability of the states' expenditure information by testing for missing data and errors, reviewing documents, and discussing the information and any limitations with state agency officials. Three states were unable to provide expenditure information specific to abandoned hardrock mines for the entire 10-year period. Therefore, we discussed and agreed with each of these states how they could provide information that most closely responded to our request—for example, by providing information for the years that were available—and we are reporting the state agencies' total expenditures as estimates. We determined that the data were sufficiently reliable to describe an estimate of how much in nonfederal and federal funds the state agencies spent to address abandoned hardrock mines.

We are reporting both federal and state agency expenditures in nominal dollars. We are doing so for several reasons, including that there was a relatively low rate of inflation from fiscal year 2008 through 2017 (about 1.5 percent per year, on average); not all states reported annual expenditures that could be adjusted for inflation; and federal and state agencies reported annual expenditures differently, with federal agencies reporting by federal fiscal year and state agencies reporting by state fiscal year.

To describe what is known about future costs to address abandoned hardrock mines, we reviewed and summarized documentation of the federal agencies' most recently available estimates of costs to inventory additional abandoned hardrock mine features and to address physical safety and environmental hazards that have not been addressed. We discussed these estimates, and the assumptions used to create the estimates, with relevant agency officials. We describe the estimates and their underlying assumptions in the report.

To identify factors that limit federal and state agencies' and stakeholders' efforts to address abandoned hardrock mines, we reviewed relevant agency documents and independent reports that describe limiting factors. We interviewed federal agency officials, state agency officials, and stakeholders. More specifically, we interviewed Forest Service, BLM, Park Service, EPA, OSMRE, and Interior headquarters officials and officials from these agencies' regional or state-based offices who work in Colorado, Montana, and Nevada. We also interviewed officials with the relevant state agencies that address abandoned hardrock mines in these

three states. We selected these states for geographic diversity, higher numbers of abandoned hardrock mines, and variation in the types of hazards posed by abandoned hardrock mines in these states. The sample of states is not generalizable, and the results of our work do not apply to all states where abandoned hardrock mines are located, but provide illustrative examples.

In addition, we obtained perspectives from stakeholders that have participated in or expressed interest in participating in projects to address abandoned hardrock mines. We interviewed a sample of stakeholders, selected to provide perspectives from industry associations, nongovernmental organizations, state agency associations, and individuals with long-standing involvement in issues related to addressing abandoned hardrock mines. We identified and selected these stakeholders based on our previous work, including the stakeholders we interviewed for our March 2008 report;⁷ a review of relevant literature, including written testimony statements and a summary of proceedings from a 2018 conference on abandoned hardrock mines; interviews with federal and state agency officials; and recommendations from stakeholders. Our sample of stakeholders is not generalizable to all stakeholders involved with abandoned hardrock mines, but provides perspectives on factors that limit efforts to address abandoned hardrock mines.

In total, we obtained responses from officials with 13 federal agency offices, including six headquarters offices and seven regional or state-based offices; officials with three states; and representatives of 11 stakeholder organizations, including three state associations that represent states with abandoned mine programs, two nonprofit conservation organizations, two mining industry associations, one mining company, and three individuals with long-standing involvement in abandoned hardrock mine policy. In our discussions, officials and representatives with each entity identified the factors that limit their or others' efforts to address abandoned hardrock mines. We reviewed the responses and identified the factors that officials and stakeholders in each group (i.e., federal agencies, state agencies, and stakeholders) frequently mentioned. Two factors arose frequently both within and across the groups—we describe these factors in our report.

⁷[GAO-08-574T](#).

**Appendix I: Objectives, Scope, and
Methodology**

We conducted this performance audit from June 2018 to March 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings based on our audit objectives.

Appendix II: Federal Expenditures to Address Abandoned Hardrock Mines, by State, Fiscal Years 2008 through 2017

Table 4 includes expenditures to address abandoned hardrock mines for the Bureau of Land Management, Environmental Protection Agency, Forest Service, Office of Surface Mining Reclamation and Enforcement, and National Park Service.

Table 4: Total Federal Expenditures to Address Abandoned Hardrock Mines, by State, Fiscal Years 2008 through 2017

Nominal dollars in thousands

State	BLM	EPA	Forest Service	OSMRE	Park Service	Total
Montana	11,838	410,423	16,399	39,356	954	478,971
Missouri	0	314,391	1,498	490	0	316,379
Idaho	12,796	275,993	8,917	0	0	297,705
Colorado	10,011	229,644	29,694	5,527	11	274,887
California	18,643	130,389	51,204	0	13,020	213,256
Oklahoma	0	162,809	0	0	0	162,809
Nebraska	0	159,205	0	0	0	159,205
Wyoming	2,782	126	35	98,885	0	101,827
Utah	6,019	77,703	436	8,798	0	92,955
South Dakota	0	44,693	36,795	0	0	81,488
Kansas	0	68,148	0	963	0	69,111
Vermont	0	67,898	0	0	0	67,898
New Mexico	7,458	37,822	13,324	5,850	0	64,454
Arizona	10,586	26,266	13,611	0	13,324	63,787
Washington	0	50,086	2,485	0	1,121	53,692
Nevada	12,944	21,647	4,450	0	501	39,542
Illinois	0	33,647	294	357	0	34,298
Indiana	0	30,943	40	0	0	30,983

**Appendix II: Federal Expenditures to Address
Abandoned Hardrock Mines, by State, Fiscal
Years 2008 through 2017**

State	BLM	EPA	Forest Service	OSMRE	Park Service	Total
Oregon	9,364	15,661	1,951	0	0	26,976
South Carolina	0	25,488	0	0	0	25,488
Alaska	12,491	2,978	5,813	142	1,274	22,699
Texas	0	1,153	0	18,881	0	20,035
North Carolina	0	10,289	0	0	0	10,289
Maine	0	9,227	0	0	0	9,227
Mississippi	0	8,499	0	0	0	8,499
New Jersey	0	6,987	0	0	45	7,033
New York	0	4,902	0	0	0	4,902
Maryland	0	4,408	0	0	0	4,408
Michigan	0	2,999	954	0	0	3,953
Ohio	0	207	3,183	344	0	3,734
Tennessee	0	3,479	0	0	0	3,479
Pennsylvania	0	3,238	15	0	0	3,253
Florida	0	1,918	0	0	0	1,918
Connecticut	0	1,400	0	0	0	1,400
Arkansas	0	22	0	0	396	417
New Hampshire	0	0	416	0	0	416
Kentucky	0	172	200	0	0	372
West Virginia	0	1	259	0	0	260
Massachusetts	0	151	0	0	0	151
Virginia	0	131	0	0	0	131
Minnesota	0	0	90	0	0	90
Georgia	0	64	0	0	0	64
Alabama	0	0	0	11	0	11
Wisconsin	0	0	5	0	0	5
Indian tribes ^a	0	43,997	0	10,377	0	54,375
Unidentified ^b	44,268	0	6,674	0	0	50,941
Total	159,199	2,289,205^c	198,742^d	189,982^e	30,645^f	2,867,772

Source: GAO analysis of agency information. | GAO-20-238

Notes: Bureau of Land Management (BLM) and Forest Service expenditures include indirect costs. Environmental Protection Agency (EPA), National Park Service (Park Service), and Office of Surface Mining Reclamation and Enforcement (OSMRE) expenditures include direct costs only. Amounts do not add to totals due to rounding.

^aEPA expenditures in this row were for sites on the Navajo Nation (Arizona, New Mexico, and Utah). For 16 additional sites that are not part of the Navajo Nation but are located, at least in part, on tribal lands, EPA's expenditures are included in the following state rows: Arizona, California, Idaho, New Mexico, Nevada, Oklahoma, Utah, and Washington. OSMRE spending in this row involved grants to the Navajo Nation and Crow Tribe.

^bExpenditures were not associated with work in one specific state.

**Appendix II: Federal Expenditures to Address
Abandoned Hardrock Mines, by State, Fiscal
Years 2008 through 2017**

^cThis includes \$983 million in reimbursements from responsible parties per settlement agreements and \$21 million in collections from states per cost sharing agreements. It does not include additional expenditures made by responsible parties that performed the cleanup work at sites under EPA oversight.

^dThis includes \$38.4 million in reimbursements from responsible parties per settlement agreements.

^eThis includes expenditure information provided by OSMRE for all states and tribes except Alaska and Colorado. For these states, we used expenditure information provided by state agencies because they were able to identify spending for projects at abandoned hardrock mines, whereas the other expenditures cover non-coal sites more broadly.

^fThis includes \$1.7 million in reimbursements from responsible parties per settlement agreements.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Anne-Marie Fennell, (202) 512-3841 or fennella@gao.gov

Staff Acknowledgments

In addition to the contact named above, Elizabeth Erdmann (Assistant Director), Leslie Kaas Pollock (Analyst-in-Charge), Matthew Elmer, William Gerard, Anne Rhodes-Kline, Sheryl Stein, Sara Sullivan, and Rajneesh Verma made key contributions to this report.

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