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Report to the Chairman, Committee on Natural Resources, House of Representatives

July 2021

FEDERAL LAND MANAGEMENT

Key Differences and Stakeholder Views of the Federal Systems Used to Manage Hardrock Mining

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GAO Highlights

Highlights of GAO-21-299, a report to the Chairman, Committee on Natural Resources, House of Representatives

July 2021

FEDERAL LAND MANAGEMENT

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Why GAO Did This Study

Hardrock minerals, such as gold and copper, are crucial resources for modern technology. However, mining by its nature can create lasting health hazards and environmental contamination.

The Department of the Interior's Bureau of Land Management and the Department of Agriculture's Forest Service are responsible for managing hardrock mining on the federal lands they manage. Federal management of hardrock mining has been a source of ongoing debate, in part because the agencies use two different systems, depending on where the resources occur:

- the location system under the General Mining Act of 1872 to manage hardrock mining on public domain lands (those usually never in state or private ownership), and
- the leasing system first adopted in the 1940s to manage hardrock mining on acquired lands (those granted or sold to the United States by a state or citizen).

GAO was asked to review hardrock mining on federal lands. This report describes, among other things, stakeholder views on the systems and areas for improvement.

GAO reviewed relevant laws, regulations, policies, and literature about mining systems. GAO interviewed agency officials. GAO interviewed stakeholders selected to reflect a broad range of perspectives from industry, public interest groups such as environmental organizations, and tribal governments.

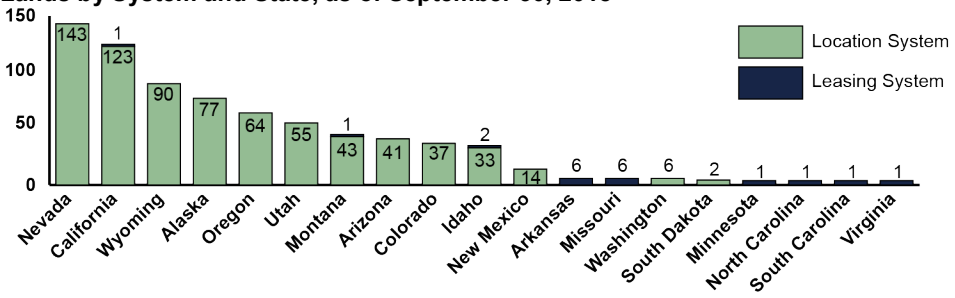
View GAO-21-299. For more information, contact Mark E. Gaffigan, (202) 512-3841 or gaffiganm@gao.gov.

What GAO Found

Stakeholders GAO interviewed provided their views on the two systems used to manage hardrock mining on federal lands (see figure). Under the location system, the public generally has the right to explore federal lands, stake mining claims, hold the claims in perpetuity, and extract minerals without paying a federal royalty. Under the leasing system, the public generally must obtain agency approval to explore federal lands for minerals and must obtain a mining lease, which sets time limits and other conditions, including paying a federal royalty. GAO found collective differences between the views of different stakeholder groups. For example:

- Industry stakeholders' comments reflected a general emphasis on certainty: certainty that federal lands will be open and available for exploration, that they will be able to develop the deposits they find, and that they will have ample time to accommodate the lengthy mine development process. These are characteristics that these stakeholders generally described as advantages of the location system.
- Public interest and tribal government stakeholders' comments reflected a general emphasis on balance: that mining will be equitably balanced with other land uses, that the public will have the opportunity to participate in land-use decisions, and that mining will not preclude other future uses of the land. These are characteristics that these stakeholders generally described as advantages of the leasing system.

Number of Hardrock Mining Operations Authorized to Produce Minerals on Federal Lands by System and State, as of September 30, 2018



Sources: GAO analysis of data from the Bureau of Land Management and the Forest Service. | GAO-21-299

Text of Number of Hardrock Mining Operations Authorized to Produce Minerals on Federal Lands by System and State, as of September 30, 2018

State	Location System
Nevada	143
California	123
Wyoming	90
Alaska	77
Oregon	64

State	Location System
Utah	55
Montana	43
Arizona	41
Colorado	37
Idaho	33
New Mexico	14
Arkansas	0
Missouri	0
Washington	6
South Dakota	2
Minnesota	0
North Carolina	0
South Carolina	0
Virginia	0
Alabama	0
Florida	0
Illinois	0
Kentucky	0
North Dakota	0
Oklahoma	0
West Virginia	0

Source: GAO analysis from the BLM and Forest Service. | GAO-21-299

However, collective comments from stakeholders suggested that neither system wholly advances their goals in all respects and those stakeholders identified areas for improvement in the management of hardrock mining on federal lands. These areas fell in three broad categories:

- **Environmental stewardship.** For example, some stakeholders said abandoned mines pose various challenges and suggested establishing federal funding sources for reclamation.
- **Administrative resources.** For example, some stakeholders said greater agency staff expertise, as well as an appropriate level of staffing, could improve overall agency management of hardrock mining activity.
- **Governance and transparency.** For example, some stakeholders identified public engagement as an overall area for improvement and said steps should be taken to increase public access to information about mining activities.

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Abbreviations

BLM	Bureau of Land Management
EA	environmental assessment
1872 Mining Law	General Mining Act of 1872
EIS	environmental impact statement
Interior	Department of the Interior
National Academies	National Academies of Sciences, Engineering, and Medicine
NEPA	National Environmental Policy Act

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July 21, 2021

The Honorable Raúl Grijalva
Chairman
Committee on Natural Resources
House of Representatives

Dear Mr. Chairman:

The mining of hardrock minerals, such as gold, silver, and copper, is essential to support the conveniences of our modern life, and yet it may create significant hazards that require costly cleanup or preclude other uses or enjoyment of federal and other lands.[1] Hardrock minerals are widely used, such as in smart phones, automobiles, renewable energy infrastructure, and defense technologies. For example, the U.S. military uses 750,000 tons of such minerals annually in the manufacture of military gear, weapon systems, and other defense applications, according to the National Mining Association. However, mining by its very nature disturbs the land and creates the potential for costly and long-lasting hazards to human health and safety and the environment. For example, surface and groundwater contamination due to the release of cyanide, acid, and metals from a closed mine on federal land in Montana resulted in a $33 million liability for long-term water treatment costs, including the possibility of water treatment in perpetuity.

Federal lands, which comprise nearly one-third of the land in the United States, constitute a significant source of hardrock minerals. Two federal land management agencies—the Department of the Interior's (Interior) Bureau of Land Management (BLM) and the Department of Agriculture's Forest Service—are responsible for managing hardrock mining activities and other uses on such lands. Specifically, BLM manages over 240 million acres of federal lands located primarily in the western half of the United States. BLM also manages the federal mineral estate—700 million acres of subsurface minerals. These include subsurface minerals under

[1]Under U.S. mining laws, minerals are classified as one of three types: locatable, leasable, or saleable. For the purposes of this report, we use "hardrock minerals" as a general term for minerals managed as "locatable" minerals under the General Mining Act of 1872 (e.g., copper, gold, gypsum, lead, magnesium, silver, uranium, and zinc), and for those same minerals managed under other laws as "leasable" minerals. Hardrock minerals do not include other leasable minerals—such as oil, gas, coal, phosphate minerals, and potash—or saleable minerals—such as common varieties of sand, stone, and gravel that are typically used to construct roads, bridges, dams, and buildings.

private lands or federal lands administered by other agencies, including the Forest Service. The Forest Service manages approximately 193 million acres of national forests and grasslands throughout the United States. The agencies' management responsibilities include overseeing mine operations to help prevent, mitigate, or manage health, safety, and environmental hazards. As part of this oversight responsibility, BLM and the Forest Service evaluate proposals for mining operations on federal lands and authorize operations for exploration, development, and production of minerals extracted from these lands.

The appropriate approach for exploration and development of federally managed hardrock minerals has been a subject of ongoing debate among stakeholders. One aspect of this debate involves the two different systems—known as the location system and the leasing system—that agencies use to manage mining of such minerals, depending on where the mineral resources occur. These two systems in the United States have resulted from different federal statutory frameworks. Opinions about these systems, and how hardrock mining on federal lands can be improved, vary and depend upon a stakeholder's goal and point of view.

You asked us to review hardrock mining on federal lands. This report describes (1) key differences between the location and leasing systems that agencies use to manage hardrock mining on federal lands and stakeholder views about the advantages and disadvantages of those systems, and (2) stakeholder views on areas for improvement in management of hardrock mining on federal lands.

To address the first objective, we reviewed relevant laws, such as the General Mining Act of 1872 (1872 Mining Law)[2] and the Act of March 4, 1917, regarding Weeks Act Minerals[3]; agency regulations, policies, and guidance; and literature about the location and leasing systems federal land management agencies use to manage hardrock mining. To inform our understanding of the systems, we also interviewed federal agency mining program officials at BLM and Forest Service headquarters. We

[2]30 U.S.C. § 22 *et seq.*

[3]16 U.S.C. § 520.

also interviewed officials from the U.S. Geological Survey to inform our general understanding of mineral resources.[4]

To determine views about the systems, we conducted 17 semistructured interviews with stakeholders, such as those from the mining industry and public interest sector. For the purposes of this report, we define "public interest stakeholders" as individuals and organizations independent of the government or industry. We selected the stakeholders to consider a range of perspectives and experiences regarding hardrock mining on federal lands. Specifically, we interviewed stakeholders familiar with federal lands and the legal frameworks for hardrock mining; mineral discovery and production; and the societal, environmental, and economic effects of mining, as well as those directly impacted by mining on federal lands.

- The industry stakeholders included representatives of two national mining associations, one individual from a state mining association, one state mining advocacy group, and one individual stakeholder with knowledge of and experience with the hardrock mining industry and federal lands governance.
- Public interest stakeholders included representatives of one national environmental organization, two state environmental organizations, two local environmental advocacy groups, and four individual stakeholders with knowledge and experience relevant to public perspectives of hardrock mining and federal lands governance.
- We also interviewed officials from two tribal governments[5] and one county government because of their experiences and proximity to proposed or existing hardrock mines on federal lands.[6]

[4]This report focuses on hardrock mineral management on lands with both surface and subsurface federal ownership. Other ownership structures, such as split estates, where the surface and subsurface rights are owned by different parties (e.g., the surface rights are privately owned, and the subsurface mineral rights belong to the federal government), are managed by agencies under separate regulations and were not a focus of this report.

[5]In this report, we refer to the range of individuals representing tribal interests, including elected officials, tribal government staff, and outside legal counsel, collectively as officials because such individuals were selected by the tribes to provide input on our review.

[6]This report focuses on hardrock mining on federal lands, not on tribal trust and restricted fee lands or state lands. For information about hardrock mining on tribal trust and restricted fee lands and state lands, see GAO, *Hardrock Mining Management: Selected Countries, U.S. States, and Tribes Have Different Governance Structures but Primarily Use Leasing,* GAO-21-298 (Washington, D.C.: June 30, 2021).

The stakeholders included national, state, and local perspectives. State and local stakeholders were from six states with proposed, current, or closed mine operations on federal lands—Arizona, Idaho, Minnesota, Montana, Nevada, and South Dakota. (See app. I for a description of stakeholders included in our review.)

We used the same semistructured interview to collect views from the two federal agencies that manage hardrock mining on federal lands—BLM and the Forest Service. During our semistructured interviews, we asked stakeholders and agency officials to identify advantages and disadvantages specific to the location and leasing systems.

To address the second objective, we asked the same stakeholders and federal agencies about broader or overarching issues regarding hardrock mining management on federals lands, including what they viewed as working well; as not working well; and considerations for improvement, if any. For both objectives, we reviewed interviewees' responses and conducted a content analysis to identify broad categories of stakeholder views about the systems, as well as their views on areas for improvement in management of hardrock mining on federal lands. While their views cannot be generalized to persons we did not interview, they provided insights about the systems used to manage hardrock mining on federal lands and considerations for improvement.

To increase our understanding of the perceived advantages and disadvantages of the systems and considerations for improvement, we reviewed reports about related topics, including those by the National Research Council[7] and the U.S. Department of Commerce.[8] In addition, as part of a larger body of work on mining, we convened an expert meeting with the assistance of the National Academies of Sciences, Engineering, and Medicine (National Academies) on principles of mining on federal lands in November 2019; details about this meeting are reported in appendix II. The meeting helped inform our understanding of key issues and topics in mining. We interviewed several of the experts that participated in our expert meeting as stakeholders for this review, given their specific knowledge of, and experiences with, hardrock mining on federal lands. We used the reports and expert meeting results to add

[7]National Research Council, *Hardrock Mining on Federal Lands* (Washington, D.C.: 1999).

[8]U.S. Department of Commerce, *A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals* (Washington, D.C.: June 2019).

greater depth to our discussion of the location and leasing systems and considerations for improvement of hardrock mining on federal lands in both objectives as appropriate.

We conducted this performance audit from September 2018 to July 2021 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 and conclusions based on our audit objectives.

Background

Uses and Supply of Hardrock Minerals

Hardrock minerals are key components for many industries, including construction, defense, aerospace, and the growing clean-energy technology sector. For example, according to a 2020 World Bank report, a low-carbon future will require a large quantity of minerals because technologies for clean energy production need more materials than technologies for fossil-fuel-based electricity generation.[9] However, viable deposits of these minerals are found in a small portion of the earth's crust and some are associated with geologic features and processes found in mountainous terrain, which can make them difficult to find and expensive to extract.

In 2018, Interior designated 35 hardrock minerals, including cobalt and lithium, as critical or vital to the economic prosperity and national security of the country. However, the United States relies on imports to meet domestic demands for 31 of these 35 minerals. In response to Executive Order 13817, issued in 2017, the Department of Commerce issued a federal strategy in 2019 to help ensure secure and reliable supplies of

[9]The World Bank, *Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition* (Washington, D.C.: 2020).

critical minerals.[10] This strategy included recommendations for developing a plan to improve understanding of the geological location of domestic critical mineral resources and for improving access to these critical minerals on federal lands.

Legacy Impacts of Mining

Since the advent of relatively widespread mining on federal lands in the mid-1800s, mining has had the potential to create significant health, safety, and environmental hazards. For example, some "legacy" hardrock-mining facilities—that is, facilities developed before the advent of modern environmental laws and regulations beginning in the 1960s—have generated large quantities of hazardous substances, often over hundreds of square miles. In some instances, legacy facilities have released acidic water carrying heavy metals and pollutants such as arsenic, mercury, and lead. Such releases have contaminated groundwater and surface water, exposing people and wildlife to harmful substances. Other hazards from legacy facilities include unsecured mine tunnels, decaying structures, and pits that were left behind after mines were abandoned. Unstable mine tunnels can collapse without warning, and unmarked open mine shafts and deep pits may harm individuals who inadvertently fall or drive into them.

Historically, the federal government took actions that facilitated mining on or near tribal lands, or on public lands off reservations on which tribes have reserved rights and resources, resulting in hazards that have adversely affected, and continue to affect, some tribal communities. For example, in the 1860s, rather than enforce the terms of the 1855 Treaty with the Nez Perce Tribe and remove mining prospectors trespassing on the Nez Perce Reservation in what is now Idaho, the federal government entered into a treaty with the tribe, reducing the size of the reservation by 90 percent to make way for mineral exploration in the region.

[10]As defined in Executive Order 13817, a critical mineral is "a mineral identified by the Secretary of the Interior [pursuant to the Executive Order] to be (i) a non-fuel mineral or mineral material essential to the economic and national security of the United States, (ii) the supply chain of which is vulnerable to disruption, and (iii) that serves an essential function in the manufacturing of a product, the absence of which would have significant consequences for our economy or our national security." 82 Fed. Reg. 60,835 (Dec. 20, 2017).

Legacy Impacts of Mining on Sioux Tribes in South Dakota

In 1868, the Fort Laramie Treaty between the U.S. government and several Indian tribes, including Sioux tribes, "set apart for the absolute and undisturbed use and occupation" a reservation for those Indian tribes. This reservation included the Black Hills of South Dakota, which, to the Sioux, are sacred lands of their traditional homeland. The treaty also stated that no treaty for the cession of any part of the reservation would be valid unless signed by three-fourths of the adult male Indian population occupying the reservation.

However, when gold was discovered, that treaty was abrogated to allow for mining in the Black Hills. Specifically, in 1876, the United States entered into a new treaty with the Sioux tribes that removed the Black Hills from the Sioux reservation. This new treaty was signed by one-tenth of the adult male Sioux population—far less than the required proportion—but was ratified by federal statute.

Among the most profitable mines in the Black Hills was the Homestake Mine. It discharged high concentrations of arsenic directly into the Cheyenne River watershed for decades, contaminating downstream creeks. In addition, intermittent floods when the mine was operating deposited arsenic-contaminated sediment in surface soils of lands used today for agriculture, ranching, and ceremonial purposes.

Open-pit from the closed Homestake Mine in the Black Hills of South Dakota.

Source: Refocus Photography/stock.adobe.com. | GAO-21-299

Since the late 1960s, various laws, agency regulations, and agency practices have affected the approach to managing mining operations on federal lands. For example:

- The National Environmental Policy Act of 1969 (NEPA) and its implementing regulations generally require federal agencies to evaluate the potential effects of a major federal action, such as agency approval of proposed mining, on the environment.[11] Agencies may prepare an environmental assessment (EA) to determine whether the project is likely to significantly affect the environment; if so, agencies are to prepare a more detailed environmental impact statement (EIS). The public has an opportunity to comment on the draft EIS.[12]
- For all federal undertakings, section 106 of the National Historic Preservation Act of 1966 requires federal agencies to take into account the undertaking's effect on any historic property, including properties of traditional religious and cultural importance to an Indian tribe that are eligible for inclusion on the National Register of Historic

[11]Pub. L. No. 91-190 (1970) (codified at 42 U.S.C. §§ 4321-4347).

[12]NEPA implementing regulations specify requirements and procedures—such as providing the public with an opportunity to comment on the draft document—applicable to the EIS process that are not mandated for EAs. *See* 40 C.F.R. § 1503.1.

Places.[13] As required by regulations implementing the act, agencies must consult with relevant state and tribal officials to, among other things, determine whether a project or activity has the potential to affect such historic properties.

- Beginning in 1974 and 1981, respectively, the Forest Service and BLM began requiring mine operators[14] to conduct reclamation of federal lands managed under the location system once mining operations ceased.[15] Reclamation 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.
- Since 2003, BLM has rewarded innovative practices by recognizing hardrock mining companies for advancing the use of sustainable development practices in their work. For example, in 2019, BLM recognized an operator for improving upon traditional reclamation practices in order to accelerate recovery of habitat for both wildlife and fisheries in the Fortymile Wild and Scenic River area of Alaska. Also in 2019, BLM recognized an operator in Nevada for closing a series of abandoned mine features that posed a threat to both public health and the environment, including vertical shafts up to 50 feet deep and shafts filled with tangled wooden beams and wire.

However, mining risks remain and may contribute to controversy surrounding proposed mining projects, particularly when economically viable mineral deposits occur on lands sacred to Indian tribes, near

[13]The regulations implementing section 106 define a historic property as any prehistoric or historic district, site, building, structure, or object included or eligible for inclusion in the National Register of Historic Places. The term includes properties of traditional religious and cultural importance to an Indian tribe that meet the National Register criteria. 36 C.F.R. § 800.16(*l*)(1).

[14]An operator is the person who conducts operations in connection with exploration, mining, and processing hardrock minerals on BLM land.

[15]Specifically, the Forest Service began requiring reclamation and financial assurances in 1974. Under the Federal Land Policy Management Act of 1976, BLM issued regulations, effective in 1981, that required mining operators to conduct reclamation of the Bureau's land disturbed by hardrock mining. BLM updated its surface management regulations in November 2000, which became effective in January 2001.

critical habitat for threatened and endangered species, or near important supplies of water for drinking and irrigation. For example, the proposed Rosemont Copper Project in the Coronado National Forest in Arizona has the estimated capacity to produce significant amounts of copper. However, the proposed mine would be developed in an area historically, spiritually, and culturally important to several tribes, including the Tohono O'odham Nation of Arizona. The area is also within critical habit for the endangered jaguar, among other species.

Mining Laws

Federal efforts to manage domestic hardrock mineral resources date back more than a century. The 1872 Mining Law established a system known as the "location system" that encouraged nonindigenous settlement and development of the West by opening up federal land to exploration, extraction, and development of hardrock minerals.

When first enacted, the 1872 Mining Law applied to many types of minerals on all federal lands. In 1920, the Mineral Leasing Act of 1920 removed certain minerals, including "fuel" minerals, such as oil and gas, on federal public domain lands—those lands that have usually never left federal ownership—from the location system and established a leasing system for those minerals.[16] The Act of March 4, 1917, regarding Weeks Act Minerals, as transferred by the Reorganization Plan No. 3 of 1946, established the leasing of hardrock minerals on acquired federal lands—those lands granted or sold to the United States by a state or citizen.[17]

As a result of the legislation enacted over time, the agencies use two different systems to manage hardrock minerals. The system used to manage hardrock minerals generally depends on the type of federal lands where the minerals exist—specifically, whether the lands are public domain or acquired. Public domain lands account for about 90 percent of

[16]41 Stat. 437 (codified as amended 30 U.S.C. § 181 et seq.).

[17]The Act of March 4, 1917, authorized the Secretary of Agriculture to issue regulations permitting mineral resource development on lands acquired under the Weeks Act. 16 U.S.C. § 520. Regulations issued under this provision authorized mineral removal subject to the payment of fees, rentals, and royalties commensurate with the value of the mineral resources. 36 C.F.R. § 251.6. Reorganization Plan No. 3 of 1946 transferred these responsibilities to the Secretary of the Interior. 60 Stat. 1097, 1099-1100.

federal lands, and acquired lands account for about 10 percent of federal lands.[18]

- Agencies generally manage hardrock minerals on public domain lands using the location system.[19]
- Agencies manage hardrock minerals on acquired lands using the leasing system.[20]

As of September 30, 2018, 97 percent of the 748 authorized hardrock mining operations on federal lands were authorized under the location system and 3 percent under the leasing system.[21] Most hardrock mining operations were authorized to produce in the western United States, with the largest number in Nevada. Hardrock mining operations authorized under the leasing system were generally in midwestern and southern states (see fig. 1).

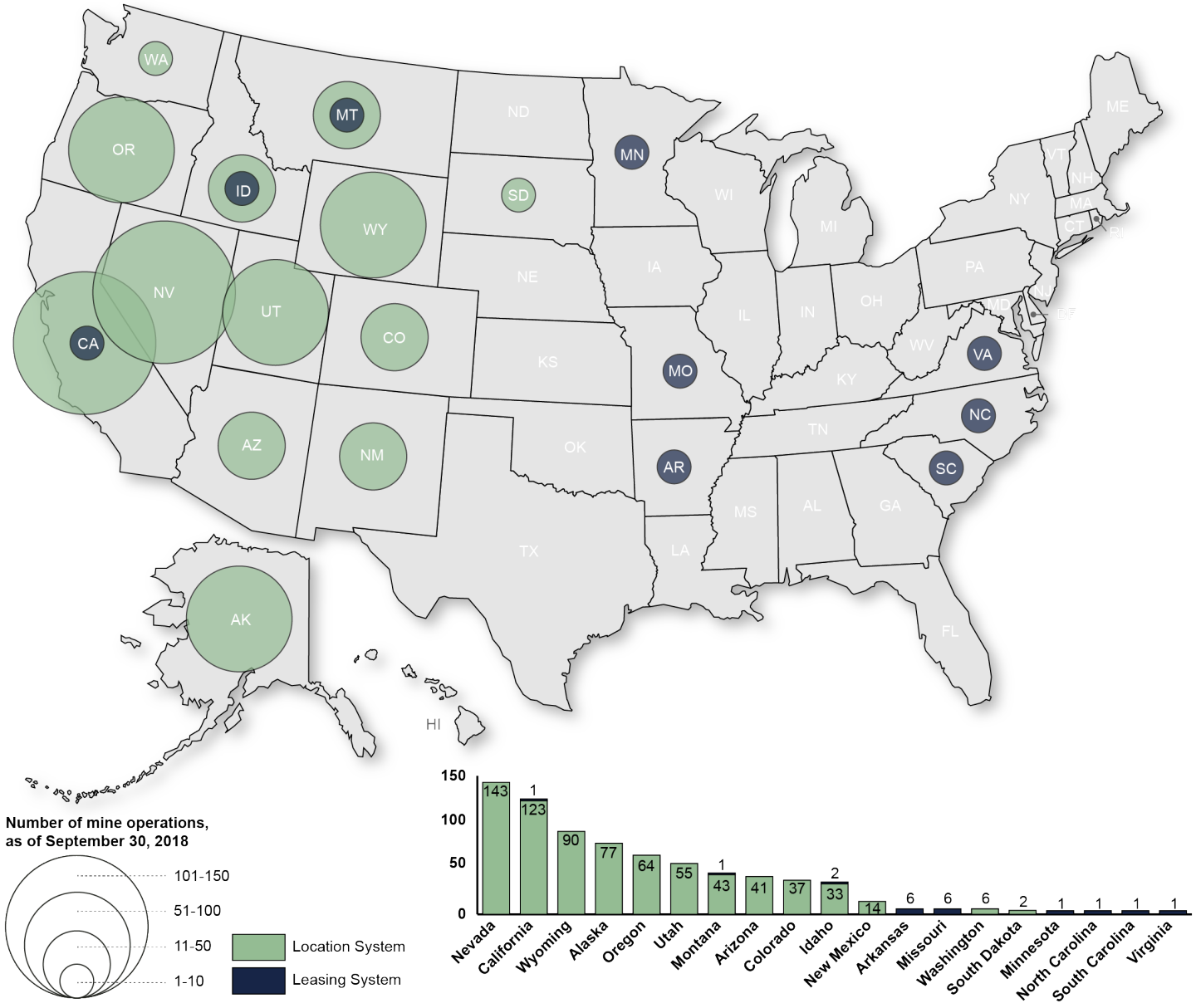
[18]Congressional Research Service, *Federal Land Ownership: Overview and Data*, R42346 (Washington, D.C.: Feb. 20, 2020).

[19]The location system is used on public domain lands in 19 states—Alaska, Arkansas, Arizona, California, Colorado, Florida, Idaho, Louisiana, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.

[20]While the leasing system is generally used on acquired lands, in limited cases, federal law provides that minerals on certain public domain land are to be managed using the leasing system. For example, public domain lands within the national forests in Minnesota are generally managed using the leasing system.

[21]GAO, *Mining on Federal Lands: More Than 800 Operations Authorized to Mine and Total Mineral Production is Unknown,* GAO-20-461R (Washington, D.C.: May 28, 2020).

Figure 1: Number of Hardrock Mining Operations Authorized to Produce Minerals on Federal Lands by System and State, as of September 30, 2018



Sources: GAO analysis of data from the Bureau of Land Management (BLM) and Forest Service; Map Resources (map). | GAO-21-299

Data table for Figure 1: Number of Hardrock Mining Operations Authorized to Produce Minerals on Federal Lands by System and State, as of September 30, 2018

State	Location System	Leasing System
Nevada	143	0
California	123	1
Wyoming	90	0
Alaska	77	0
Oregon	64	0
Utah	55	0
Montana	43	1
Arizona	41	0
Colorado	37	0
Idaho	33	2
New Mexico	14	0
Arkansas	0	6
Missouri	0	6
Washington	6	0
South Dakota	2	0
Minnesota	0	1
North Carolina	0	1
South Carolina	0	1
Virginia	0	1
Alabama	0	0
Florida	0	0
Illinois	0	0
Kentucky	0	0
North Dakota	0	0
Oklahoma	0	0
West Virginia	0	0

Source: GAO analysis from the BLM and Forest Service. | GAO-21-299

While the leasing system is used less frequently than the location system to manage hardrock mining on federal lands, we have previously reported that it is the primary system used to manage hardrock mining on state lands in 11 western states and in the major mineral-producing countries of Australia, Canada, and Chile.[22] However, on some state lands in Alaska and in some Canadian provinces, mineral exploration is managed using a location system, but individuals must obtain a lease before beginning mineral extraction.

Agency Roles and Responsibilities for Managing Hardrock Mining

BLM and the Forest Service have different roles in administering hardrock mining activities, depending on the system under which those minerals are managed.

- Under the location system, BLM and the Forest Service each have separate authority, regulations, and programs to evaluate and approve hardrock mining operations on the lands they manage.
- Under the leasing system, BLM administers hardrock mineral leasing on lands that it manages, as well as the federal mineral estate underlying Forest Service-managed lands. BLM must have the consent of the Secretary of Agriculture before it can issue leases that include Forest Service-managed lands. Consent is generally provided through the Chief of the Forest Service.[23] Eighteen of the 20 hardrock mining operations authorized to produce minerals under the leasing system as of September 30, 2018, occurred on Forest Service-managed lands.

BLM and the Forest Service are generally to balance the interests of different uses—such as timber harvesting, protection of fish and wildlife habitat, recreation, and mineral production—with the need to protect the environment. Specifically, the Federal Land Policy and Management Act of 1976 provides that, in managing the public lands, the Secretary of the Interior shall, by regulation or otherwise, take any action necessary to

[22]GAO-21-298.

[23]Interior is authorized to administer the leasing of federal minerals subject to leasing laws; this function is carried out by BLM.

prevent the unnecessary or undue degradation of the lands.[24] In carrying out Interior's responsibilities under the act, BLM has developed and revised regulations and issued policies to prevent unnecessary or undue degradation of BLM lands from hardrock operations.[25] In addition, Forest Service regulations for managing hardrock mining under the location system provide that all operations shall be conducted so as, where feasible, to minimize adverse environmental impacts on National Forest System surface resources.[26]

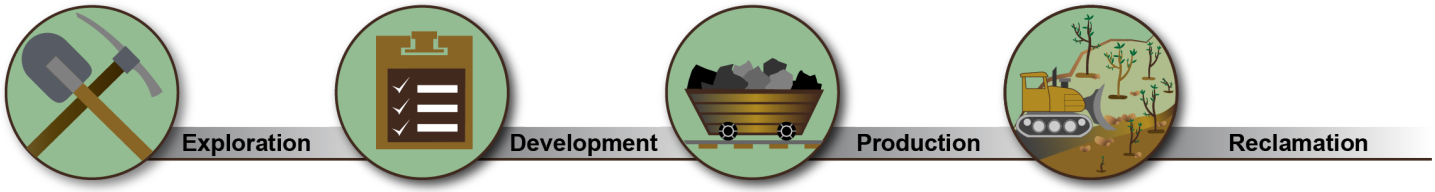
The federal agencies have a role in managing hardrock minerals throughout the four primary stages of hardrock mineral operations under both the location and leasing systems—mineral exploration, mine development, mineral production, and reclamation (see fig. 2).

[24]Pub. L. No. 94-579, § 302, 90 Stat. 2743, 2762 (codified as amended at 43 U.S.C. § 1732(b)).

[25]BLM defines "unnecessary or undue degradation" by regulation as conditions, activities, or practices that (1) fail to comply with one or more of the following: performance standards specified by regulation, the terms and conditions of an approved plan of operations, operations described in a complete notice, and other federal and state laws related to environmental protection and protection of cultural resources; (2) are not "reasonably incident" to prospecting, mining, or processing operations as defined by regulation; or (3) fail to attain a stated level of protection or reclamation required by specific laws in areas such as the California Desert Conservation Area, Wild and Scenic Rivers, BLM-administered portions of the National Wilderness System, and BLM-administered National Monuments and National Conservation Areas. 43 C.F.R. § 3809.5.

[26]36 C.F.R. § 228.8.

Figure 2: Primary Stages of Hardrock Mineral Operations



Usually involves prospecting, and other steps, such as surveying, drilling, and taking samples of mineral deposits to locate and define the extent and value of mineral deposits. Acquiring legal rights to explore and extract minerals may involve staking a mining claim, applying for a lease, or filing paperwork to obtain a permit or license.

Involves completing the mine plan approval process by investigating how mining will impact the environment, determining how to mitigate the risks associated with mineral extraction, and obtaining permits and authorizations from federal, state, and local regulatory entities. The operator is also required to provide a financial assurance sufficient to cover the cost of reclamation, should the operator fail to reclaim the site. Once authorizations are obtained and financial assurances are provided, the mine operator constructs mine infrastructure, such as tunnels, buildings, and roads to facilitate production.

Involves drilling, blasting, and hauling ore from mining sites to processing sites. During production, operators crush or grind the ore and apply chemical treatments to extract the minerals of value. The material left after the minerals are extracted—waste rock or tailings (a combination of fluid and rock particles)—is then disposed of, often in a nearby pile or tailings pond. Operators may be required to pay the federal government a royalty and report the mineral type and amount produced.

Practices vary by type of operation and by applicable federal, state, and local requirements. However, reclamation usually involves reshaping and revegetating disturbed areas; measures to minimize erosion; removing or stabilizing buildings and other structures to reduce safety risks; and measures to isolate, remove, or control toxic materials. For example, capping and revegetating tailings and waste rock piles are steps taken to help control erosion and minimize the potential for contamination of groundwater from acid rock drainage and other potential water pollution problems.

Source: GAO analysis. | GAO-21-299

Text of Figure 2: Primary Stages of Hardrock Mineral Operations

- **Exploration** - usually involves prospecting, and other steps, such as surveying, drilling, and taking samples of mineral deposits to locate and define the extent and value of mineral deposits. Acquiring legal rights to explore and extract minerals may involve staking a mining claim, applying for a lease, or filing paperwork to obtain a permit or license.
- **Development** - involves completing the mine plan approval process by investigating how mining will impact the environment, determining how to mitigate the risks associated with mineral extraction, and obtaining permits and authorizations from federal, state, and local regulatory entities. The operator is also required to provide a financial assurance sufficient to cover the cost of reclamation, should the operator fail to reclaim the site. Once authorizations are obtained and financial assurances are provided, the mine operator constructs mine infrastructure, such as tunnels, buildings, and roads to facilitate production.
- **Production** - generally involves drilling, blasting, and hauling ore from mining sites to processing sites. During production, operators crush or grind the ore and apply chemical treatments to extract the minerals of

value. The material left after the minerals are extracted—waste rock or tailings (a combination of fluid and rock particles)—is then disposed of, often in a nearby pile or tailings pond. Operators may be required to pay the federal government a royalty and report the mineral type and amount produced.

- **Reclamation** - practices vary by type of operation and by applicable federal, state, and local requirements. However, reclamation usually involves reshaping and revegetating disturbed areas; measures to minimize erosion; removing or stabilizing buildings and other structures to reduce safety risks; and measures to isolate, remove, or control toxic materials. For example, capping and revegetating tailings and waste rock piles are steps taken to help control erosion and minimize the potential for contamination of groundwater from acid rock drainage and other potential water pollution problems.

Source: GAO Analysis. | GAO-21-299

One way BLM and the Forest Service analyze and seek to mitigate the potentially harmful effects of mining on federal lands is through the mine plan review and approval process, which is described under specific agency regulations.[27] Regardless of the system under which the mining operation is managed, the process generally involves the following:

- A mine operator must submit a mine plan of operation detailing the operational aspects of the mine, such as the mining methods and techniques that will be employed and how reclamation will occur once operations are concluded. Once the agency determines the proposed plan to be complete, it analyzes the potential impacts of the proposed activity on the environment, human health, and cultural resources by conducting an analysis under NEPA to disclose reasonably foreseeable impacts associated with operations.
- The agency with jurisdiction approves the mine plan, and the operator must furnish an acceptable financial assurance to pay for reclamation costs for lands disturbed by hardrock mining operations. Once operators meet such requirements, the agency then authorizes operations under its jurisdiction. However, an operator may need to obtain additional permits or authorizations from other federal, state, local, and regulatory entities in order to begin operations. For

[27]Regulations implementing the 1872 Mining Law for BLM are codified at 43 C.F.R. pt. 3800 and for the Forest Service are codified at 36 C.F.R. pt. 228, subpt. A. Regulations for hardrock leasable minerals are codified at 43 C.F.R. pt. 3500.

example, operators may need to obtain a permit under section 404 of the Clean Water Act from the U.S. Army Corps of Engineers for the discharge of dredged or fill material, such as soil from mine excavations, into certain waters.[28]

Key Differences between the Systems for Managing Hardrock Mining on Federal Lands and Stakeholder Views on Their Advantages and Disadvantages

We found that the key differences between the location and leasing systems used to manage hardrock mining on federal lands concern initial access to federal lands and exploration requirements, rights conveyed and their duration, and federal royalties and fees. Stakeholders we interviewed identified advantages and disadvantages of the systems that related to advancing various goals, such as for promoting minerals exploration or managing the land for multiple uses. Table 1 summarizes key differences between the systems.

Table 1: Key Differences between the Location and Leasing Systems Used to Manage Hardrock Minerals on Federal Lands

	Location system	Leasing system
Initial access to federal lands and exploration requirements	The public generally has free and open access to public domain lands unless the lands are otherwise closed or withdrawn from mineral entry.[a] Individuals and operators may conduct certain exploration activities on public lands without agency approval.	The public may access acquired lands and limited public domain lands after they are identified by the Bureau of Land Management (BLM) or the Forest Service as open to mineral activity (i.e., leasing) in a land management plan. Individuals and operators must obtain agency approval to conduct exploration activities.
Rights conveyed and their duration	The General Mining Act of 1872 (1872 Mining Law) grants individuals a statutory right to explore, develop, and mine on public domain lands open to mineral entry.[b] A mining claim gives a claim holder the exclusive right to conduct mining activities and activities reasonably incident to mining. Rights conveyed through a mining claim can exist in perpetuity as long as the claim holder pays an annual maintenance fee or files a maintenance fee waiver each year.	Individuals must follow steps detailed in BLM regulations in order to obtain a prospecting permit, exploration license, or lease, the terms of which provide the temporary right of use and occupation. A permit is effective for an initial term of 2 years, and BLM may extend it for up to 4 more years. An exploration license is in effect for 2 years. An initial lease is not to exceed 20 years but can be renewed for 10 years at the end of the initial term and for following 10-year periods.[c]

[28] *See* 33 U.S.C. § 1344.

	Location system	Leasing system
Federal royalties and fees	Operators pay no federal royalties and therefore are not required to report to the federal government what minerals are being extracted, or the amount or value of those minerals. Mining claim holders pay one-time claim location fees and annual fees to maintain a claim.[d]	Operators pay federal royalties on minerals produced from leasing and are required to report production data, which includes the minerals being extracted and the amount or value of those minerals. Operators also pay one-time permit or lease fees and annual per acre rental fees.

Source: GAO analysis of laws, regulations, and agency documents. | GAO-21-299

[a]Federal lands can be withdrawn from being available under the 1872 Mining Law in several ways, including by the President, by legislation, or by the Secretary of the Interior.

[b]Under the 1872 Mining Law, claim holders desiring to acquire all rights and interests associated with economically viable claims can obtain a patent that conveys ownership of the surface and mineral estate to the individual (known as fee-simple title). However, since fiscal year 1995, Congress has put in place a series of 1-year moratoriums on the issuance of mineral patents through provisions in annual appropriations acts.

[c]BLM regulations do not specify the number of 10-year periods that can follow the initial 20-year lease. See 43 C.F.R. § 3511.15(f).

[d]Specifically, claim holders can pay annual fees to maintain a claim in lieu of a requirement to perform annual assessment work, such as through drilling, excavating, and surveying.

Initial Access to Federal Lands and Exploration Requirements

Key Differences between the Location and Leasing Systems

Location system. Under the location system, public domain lands are generally considered accessible or open to individuals and operators to freely prospect for hardrock minerals, unless the lands have been closed or "withdrawn" from mineral entry. Areas withdrawn from location of mining claims and sites include national parks, national monuments, and military reservations, among others. Mining claims may not be located on land that Congress has designated as part of the National Wilderness Preservation System; designated as a wild portion of a Wild and Scenic River; or that Congress has withdrawn for study as a Wild and Scenic River.[29]

[29]The Secretary of the Interior may temporarily withdraw federal lands from mineral entry for certain purposes, such as maintaining other public values in the area or reserving the lands for a particular public purpose or program.

Initial access to prospect for hardrock minerals on public domain lands is self initiated.[30] Individuals and operators may conduct exploration activities resulting in minimal or negligible disturbance to the public lands or resources—such as collecting soil or rock samples with hand tools—without prior agency notification or approval.[31] For example, an individual may generally stake a mine claim without notifying federal agencies beforehand and without seeking or obtaining agency approval.[32] Although the 1872 Mining Law calls for discovery of a valuable mineral deposit before locating a mining claim, in practice, individuals often stake a claim first to protect their interests against rival claimants.[33]

To conduct certain exploration activities that will constitute more than negligible use, an operator may need to either notify the relevant federal land management agency or obtain its approval. However, the level of activity that requires agency notification or approval differs between BLM and the Forest Service.

- For exploration operations that will disturb 5 acres or less of land—known as notice-level operations—operators are required to file a notice that informs BLM of the operators' proposed activities. For operations that constitute more than casual use and notice-level

[30]An individual stakes a claim by distinctly and clearly marking the boundaries of the claim and recording it with the proper BLM state office and the county in which the claim is located. Claims can be marked through a variety of means, including stone mounds, and wood or metal posts, in accordance with state statutes.

[31]Under BLM regulations, operators may conduct "casual use activities," defined as activities ordinarily resulting in no or negligible disturbance to the public lands or resources, without providing notice to BLM. 43 C.F.R. §§ 3809.5, 3809.10(a). Under Forest Service regulations, operators must file a notice of intent if they propose to conduct operations that might cause a significant disturbance of surface resources; if proposed operations do not meet that threshold, operators may proceed without notifying the Forest Service or filing a mine plan. 36 C.F.R. § 228.4(a).

[32]There are two types of claims, lode and placer. Deposits subject to lode claims include veins, ledges, or other rock that is in place having well-defined boundaries. Federal statute limits their size to a maximum of 1500 feet in length, and 600 feet in width (300 feet on either side of the vein)—approximately 20 acres. Placer claims include minerals redeposited in river sands or gravel. The maximum size of an individual placer claim is 20 acres. The mill site—generally used to support a lode or placer mining operation—is not included as a part of the claim. It is not to exceed 5 acres, must be located on nonmineral lands, and must be noncontiguous to the lode or placer with which it is associated.

[33]The Supreme Court has held that prediscovery location of mining claims does not violate the statute. Union Oil Co. v. Smith, 249 U.S. at 337, 347 (1919). The Supreme Court has also recognized certain possessory rights, prior to the discovery required by statute, if the claimant is diligently prospecting. *Id.* at 348; *See also* Cole v. Ralph, 252 U.S. 286, 294-95 (1920).

surface disturbance, operators must submit a plan of operations for review and approval—known as plan-level operations.

- In contrast, Forest Service regulations do not include an acreage threshold differentiating the requirement to file a notice of intent to operate rather than a plan of operations for approval. Instead, notification is required for operations that might cause significant disturbance of surface resources and agency approval of a plan of operations is required for operations that will likely cause a significant disturbance of surface resources. According to a senior Forest Service official, most mining activities on Forest Service-managed lands require agency approval of a plan of operations.

Activities requiring agency approval through plans of operation for both BLM and the Forest Service require NEPA review and financial assurances for reclamation. (See table 2.)

Table 2: Requirements for Hardrock Mineral Exploration Activities under the Location System, by Agency

Agency	Agency notification	Agency approval
Bureau of Land Management	✓ (YES). Agency notification required for exploration operations causing surface disturbance of 5 acres or less ✕ (NO). Analysis of activity conducted under the National Environmental Policy Act (NEPA) not required ✓ (YES). Financial assurance for reclamation required	✓ (YES). Agency approval required for any operation more than casual use and notice-level disturbance ✓ (YES). NEPA analysis required ✓ (YES). Financial assurance for reclamation required
Forest Service	✓ (YES). Agency notification required for operations that might cause significant disturbance of surface resources ✕ (NO). Analysis of activity conducted under NEPA not required ✕ (NO). Financial assurance for reclamation not required	✓ (YES). Agency approval required for operations that will likely cause a significant disturbance of surface resources ✓ (YES). NEPA analysis required ✓ (YES). Financial assurance for reclamation required

Source: GAO analysis of laws, regulations, and agency documents. | GAO-21-299

Leasing system. Under the leasing system, agencies use land management planning to identify the federal lands accessible to individuals for prospecting and open for mineral leasing. Operators must obtain agency approval before conducting exploration activities on federal lands subject to the leasing system.[34] This approval can occur through a BLM-issued prospecting permit, exploration license, or lease. Permits,

[34]For exploration activities on BLM-managed lands, operators must first obtain authorization from BLM (and when on Forest Service lands, in consultation with the Forest Service).

licenses, and leases are used in different situations, but all require approval of an operation plan, NEPA analysis, and financial assurances for reclamation.

- Where mineral deposits are not known to exist, operators may seek a prospecting permit from BLM, which allows exploration for leasable mineral deposits.
- Where mineral deposits are known to exist, operators may seek an exploration license from BLM, which allows exploration of known, unleased mineral deposits, to obtain geologic, environmental, and other pertinent data ahead of applying for a competitive lease.
- Where valuable mineral deposits are known to exist and no further prospecting or exploration is needed to determine the existence or workability of a valuable mineral deposit, operators may directly seek a competitive lease without first obtaining an exploration license.

As noted earlier, BLM administers hardrock mineral leasing on lands that it manages, as well as the federal mineral estate underlying Forest Service-managed lands, on which the majority of federally authorized hardrock leases occur. However, BLM must obtain written Forest Service consent before issuing a prospecting permit or lease on Forest Service-managed acquired lands. According to Forest Service officials, Forest Service consent or denial of consent decisions are subject to its NEPA procedures. The Forest Service may request further information about surface disturbance and reclamation before granting its consent, and may condition its consent on certain stipulations for BLM to include as terms of the permit or lease.[35]

Stakeholder Views about System Advantages and Disadvantages

Location system. Regarding initial access for mining activity on federal lands, some industry stakeholders and officials with both federal agencies said the self-initiated, open aspects of the location system provide individuals and operators flexibility to explore for hardrock mineral deposits across a wide geographic area. They said wide geographic access is important because valuable hardrock mineral deposits can be difficult to find. They said such access also accommodates the iterative process of exploration. For example, if prospectors or geologists

[35]Specifically, under BLM regulations, BLM will specify permit or lease stipulations to adequately use and protect the lands and their resources, which may include stipulations required by the Forest Service, as the surface managing agency, or recommended by the Forest Service and accepted by BLM. 43 C.F.R. § 3503.28.

determine they need to search farther along a fault, they can continue searching beyond a particular area until they find the boundaries of the mineral deposit.

In contrast, some public interest stakeholders said that this aspect of the location system is disadvantageous because it allows individuals and operators to determine that a particular area should be used for mining activity, including in areas that other stakeholders may view as being less suitable for mining. In particular, some stakeholders noted that federal land management agencies do not have discretion to decide where the mining activity, on lands open to mining, is to occur. In this way, these stakeholders noted that mining, particularly under the location system, is given priority over other uses of the land. For example, according to one public interest stakeholder, a proposed copper and silver mine in western Montana would threaten grizzly bear and bull trout—threatened species protected under the Endangered Species Act—and areas sacred to the Confederated Salish and Kootenai Tribes. In particular, some public interest stakeholders said that self-initiation to conduct mining activities, including staking claims, means that the land management agencies do not know where claims are being staked until a mine claim is filed. In addition, according to some stakeholders, there is limited opportunity for public input under the location system. Because not all exploration activities require agency approval and NEPA review, the public may not have an opportunity to comment on mine activity because they may not know of certain exploration activities until after they have occurred, according to those stakeholders.

Leasing system. Some public interest stakeholders, officials from the Tohono O'odham Nation, and BLM officials said an advantage of the leasing system is that it provides land management agencies discretion to determine where mining activity may occur and to consider mining activities on public lands within the context of broader prospective land use planning and management. Further, some public interest stakeholders said the leasing system provides opportunities for public engagement and input about mining activity.

However, some industry stakeholders said that the spatial constraints of the leasing system limit prospecting and exploration to particular areas. In addition, some stakeholders said that the required approvals for prospecting and exploration can introduce uncertainty for operators because accessing additional lands for mineral exploration or development depends on the agencies' discretion to approve modifications or additional leases. For example, according to some

industry stakeholders, if operators identify a deposit at the edge of a lease boundary, they must either seek to modify their lease or apply for another lease before continuing their exploration efforts. Furthermore, some industry stakeholders said obtaining such approvals can be costly and time consuming. Similarly, Forest Service officials said that the permitting process under the leasing system can be more time consuming and more complicated than under the location system because it requires greater coordination between the Forest Service and other federal agencies.

Rights Conveyed and Their Duration

Key Differences between the Location and Leasing Systems

Location system. Under the location system, the 1872 Mining Law grants individuals a statutory right to explore, develop, and mine lands open to mineral entry.[36] A mining claim gives the claim holder the exclusive right to conduct such activities by excluding third parties from engaging in mineral activity on the land covered by the mining claim and by not having to compete with other individuals or operators for the right to extract the minerals. Under the location system, the claim holder may maintain rights to the claim in perpetuity, without any requirement to develop the mineral, as long as the claimant pays an annual maintenance fee of $165 per claim or annually obtains a waiver, such as a small miner waiver if a claimant meets certain conditions, including holding no more than 10 claims nationwide. In addition, the 1872 Mining Law allows claim holders desiring to acquire all rights and interests associated with economically viable claims to obtain a patent that conveys ownership of the land and minerals to the individual. Once a patent is issued, the government no longer has title to either the minerals or the land. However, since fiscal year 1995, Congress has put in place a series of 1-year moratoriums on the issuance of mineral patents through provisions in annual appropriations acts.[37]

[36]Under a claim, operators may conduct activities reasonably incident to mining.

[37]The Consolidated Appropriations Act, 2021 contains the most recent statutory prohibition. The act provides that none of the funds appropriated under it are to be obligated or expended to accept or process applications for a patent for any mining or mill claim located under the general mining laws. Pub. L. No. 116-260, div. G, tit. IV, § 404, 134 Stat. 1182, 1535 (2020).

Leasing system. Under the leasing system, individuals must follow steps detailed in BLM regulations in order to obtain a prospecting permit, exploration license, or lease, the terms of which specify a temporary right of use and occupation. Specifically, a prospecting permit is effective for an initial term of 2 years, and BLM may extend the permit for up to 4 more years, for a total of 6 years. An exploration license is in effect for 2 years and cannot be extended. The duration of the initial term of a hardrock mining lease is not to exceed 20 years, but a lease can be renewed for additional 10-year periods.[38] In addition, BLM can specify conditions, known as stipulations that apply to the prospecting permit, exploration license, or lease and can be adjusted if a prospecting permit is extended or a lease is renewed.[39] For example, to minimize water contamination from exploration activities, BLM may stipulate that prospecting permit holders use absorbent mats under equipment to contain spills and not store fuel in wetlands. In addition, all leases include standard requirements to pursue diligent mineral development.[40]

Under the leasing system, BLM may issue competitive and noncompetitive leases. BLM may offer competitive leases on unleased lands where known valuable minerals exist. BLM awards competitive leases through sale to a qualified bidder who offers the highest acceptable bonus bid. Where minerals were previously not known to exist, and BLM issued a prospecting permit, BLM may issue a noncompetitive or a preference-right lease, depending on the authority under which the prospecting permit is issued, to the permit holder who, during the term of the permit, demonstrates the discovery of a valuable

[38]BLM regulations do not specify a limit on the number of 10-year lease renewals.

[39]Surface management agency stipulations usually establish where surface use and occupancy may occur and are designed to protect surface uses and resources. This may include stipulations that the surface managing agency requires or that the surface managing agency or nonfederal surface owner recommends and that are accepted by BLM.

[40]For example, lease language under a preference right lease states that the leaseholder shall produce on an annual basis a specified monetary amount, except when production is interrupted by strikes, the elements, or casualties not attributable to the leaseholder. BLM may also permit suspension of operations under the lease when marketing conditions are such that the lease cannot be operated except at a loss. In addition, leaseholders may pay a minimum royalty payment of $3.00 per acre, or fraction thereof, in lieu of production requirements. Minimum royalty payments are to be credited to production royalties for that year.

deposit of the leasable mineral for which BLM issued the permit.[41] According to BLM officials, BLM issued preference-right leases for each of the 20 mine operations authorized to produce minerals under the leasing system, as of September 30, 2018.

[41]Specifically, BLM regulations provide that in order to obtain a preference right lease, an operator must have a prospecting permit for the area and demonstrate the discovery of a valuable deposit within the period that the prospecting permit covers. 43 C.F.R. § 3507.11(a). However, prospecting permits for minerals BLM administers under the authority of Reorganization Plan No. 3 of 1946 do not entitle a permit holder to a preference right lease, although BLM may grant a noncompetitive lease if a valuable deposit is discovered during the permit term. *Id.* § 3507.11(d).

Stakeholder Views about System Advantages and Disadvantages

Location system. Some industry stakeholders said the absence of time limits associated with the location system is helpful for hardrock mineral development because it provides operators ample time to explore, develop, and produce minerals. They said this aspect of the location system is particularly important for hardrock minerals because discovering valuable hardrock mineral deposits can take a long time—up to 20 years, compared with other mineral types, such as oil and gas, or coal, which are easier to find. In addition, they said that the absence of time limits provides operators with certainty in their investments to complete exploration, development, and production.

Some industry stakeholders and BLM officials also said that open time limits provide flexibility to accommodate gradual increases in demand and improvements in mining technology that may make mineral extraction more economical in future years. For example, giving operators ample time to adapt to new mining methods and technologies, over time, could result in feasible production of lower grade ore deposits. Some stakeholders also said that this aspect of the location system provides operators flexibility to adjust their production levels to account for the fluctuating supply and demand or price of minerals.

However, one public interest stakeholder said that perpetual rights under the location system may indefinitely restrict public lands from other uses, such as recreation, even after active mining has ceased. For example, according to this stakeholder, the Sleeper Mine in Nevada remains closed to other public uses even though mining there ended in 1996. Although the operator completed reclamation of the mine, which resulted in a lake that could be used for recreational purposes, according to the stakeholder, the area is still off-limits to the public because the operator says there may be more gold to mine.[42]

Example of Complexities Associated with Mining Under the Location System

As of May 2021, the Forest Service is reviewing the potential impacts of approving the Stibnite Gold Project proposed by an operator in the remote headwaters of the East Fork South Fork Salmon River on the Payette and Boise National Forests in Idaho. The watershed contains numerous cultural landscapes and features that are fundamental to Nez Perce Tribal tradition and ceremonies. Mining in this area began over 100 years ago and left a legacy of toxic pollution and damage, including loss of fish passage for chinook salmon, steelhead, and bull trout.

The Stibnite Gold Project would remine old tailings piles and open pits and mine new areas to extract gold and antimony as a byproduct. Antimony is used in wind and solar energy applications and is a mineral for which the United States relies on imports to meet manufacturing demands. In addition, the operator proposes to restore some of the area's legacy mine tailings and reestablish fish passages in the mine site. The operator expects to employ up to 600 people and create other jobs in the region during the proposed 20-year lifespan of the mining operations.

However, opponents say this project poses a threat to water quality, important wild salmon and steelhead spawning habitat, upland terrestrial habitat, and the recreational economy. According to officials from the Nez Perce Tribe, this project also jeopardizes reserved fishing and hunting rights for the Nez Perce Tribe enumerated in its 1855 treaty with the federal government, and threatens the livelihood, health, and socioeconomic well-being of tribal members.

Legacy open-pit at the Stibnite Gold Project in Idaho.

Source: U.S. Forest Service. | GAO-21-299

[42]A mine pit lake is the result of open-pit surface mining operations. Open-pits are excavated to extract a large ore body, and when these open pits are deeper than the water table the mining company needs to pump groundwater from them continuously to allow for mining to take place. Once the ore body is depleted, the pumps that are keeping the pit dry are turned off and the open-pit floods with water. The flooding process generally continues for a number of years until the lake surface is approximately equal to the original elevation of the water table.

Conflicting Views on Hardrock Mineral Leases in the Superior National Forest in Minnesota

Conflicting views about the future of a proposed mine on leases held by Twin Metals Minnesota in the Superior National Forest in Minnesota illustrate the complexity of mining on federal lands.

This area of Minnesota has historical roots in mining iron ore and has supported mining jobs for generations. Recently, the area has become a focal point of debate as mining companies seek to conduct copper-nickel mining for the first time in the area.

Although hardrock mineral leases in the area were originally issued by the Bureau of Land Management (BLM) in 1966, and were renewed multiple times since that time, no mineral production has occurred under these leases. The leases are located adjacent to the Boundary Waters Canoe Area Wilderness, one of the most visited wilderness areas in the country. The area's water-based ecosystem is known for excellent water quality and generates economic benefits to the area through recreation tourism. The proximity of the proposed mine sites to the wilderness area has generated concerns about the environmental risk that mining could have on the areas aquatic life, sport fisheries, and recreation-based communities.

BLM approved the latest lease renewals in 2019. As of May 2021, the agencies were reviewing the mine plan that the operator submitted in December 2019.

The water-based ecosystem found in the Boundary Waters Canoe Area Wilderness in Minnesota.

Source: Jacob/stock.adobe.com. | GAO-21-299

Leasing system. Some public interest stakeholders said the time limits and lease terms under the leasing system can be used to encourage accountability for diligent development and stewardship. For example, BLM has placed terms on renewed leases that include operator requirements to submit a complete, proposed mine plan of operations, obtain all necessary permits, and meet certain project milestones for mine construction within a 10-year term, or the leases will be terminated. It has also placed terms on renewed leases that include measures for environmental protection, such as prohibitions on open-pit mining.

Some industry stakeholders said that term limits under the leasing system are not typically commensurate with the time needed to discover, develop, and produce minerals. For example, one stakeholder said that the 2-year limits on the initial term of prospecting permits—which may be extended for 4 years (for 6 years total)—are usually not long enough for mineral discovery. Some stakeholders said that the short duration of leases does not reflect the reality of the commodities markets and the fluctuation in prices of metals over the course of many years, specifically noting that the timeframes under the leasing system are not long enough to account for such fluctuation.

In addition, some stakeholders said that term limits create operator uncertainty and barriers to hardrock mineral investment because, despite an operator's earlier investment in exploration or mineral production, operators are dependent on the agency's discretion to issue and renew leases. For example, those stakeholders noted that having to obtain agency-approved 10-year lease renewals for development lasting longer than the initial 20-year lease term creates uncertainty that an operator could continue to operate its mine at the end of the lease. Some stakeholders also said that criteria for obtaining preference right leases under a prospecting permit are unclear and, because the lease's approval also relies on agency discretion, this creates uncertainty for operators investing in exploration under the leasing system. However, a public interest stakeholder likened the historic practice of renewing hardrock mining leases over many decades to the perpetual rights under the location system. For example, BLM has renewed more than 30 leases for the operating Doe Run Mine on the Mark Twain National Forest in Missouri from 2 to 6 times each. The earliest lease issued for that mine was in 1955; BLM has renewed that lease six times. According to BLM officials, BLM did not deny any lease renewals for the 20 hardrock mining operations authorized under the leasing system as of September 2018. Rather, BLM has renewed leases multiple times and over many decades.

Federal Royalties and Fees

Key Differences between the Location and Leasing Systems

Location system. Under the location system, operators do not pay royalties to the federal government on the minerals produced, although they may pay royalties to states.[43] Therefore, operators are not required to report the mineral type or amount of minerals produced, and the total quantity and types of minerals produced from federal lands is unknown. Regarding fees, as stated earlier, claim holders are to pay one-time per claim fees, generally totaling $225, due at the time of recording the mining claim.[44] After that, claim holders are to pay an annual per claim maintenance fee of $165 to retain their mining claim.[45] BLM is authorized to retain a portion of the receipts, the remainder of which are to be deposited in the U.S. Treasury's General Fund.[46]

Leasing system. Under the leasing system, operators pay the federal government a royalty—that is, a percentage of the quantity or gross value of the output of the minerals produced from leases. To determine the amount of royalties owed, operators are required to report the mineral type and amount produced.[47] There are no minimum royalty rates for hardrock minerals, unlike for other leasable minerals such as coal and

[43]Many states charge royalties and taxes on hardrock mine operations on federal lands. See GAO, *Hardrock Mining: Updated Information on State Royalties and Taxes*, B-330854 (Washington, D.C.: July 16, 2019).

[44]The fees comprise a $20 claim processing fee; a $40 location fee; and an initial maintenance fee of $165 for lode claims, mill sites, and tunnel sites. For placer claims, the initial maintenance fee is $165 per every 20 acres or portion thereof. For example, the initial maintenance fee for a placer claim of 40 acres would be $330.These fee amounts are current as of September 1, 2019. The Secretary of the Interior is to adjust maintenance and location fees to reflect changes in the Consumer Price Index every 5 years or more frequently if the Secretary determines an adjustment to be reasonable.

[45]Paying the maintenance fee replaces the requirement of performing annual assessment work on a mining claim. This amount is to be paid for each lode claim, mill site, and tunnel site. For placer claims, the annual maintenance fee is $165 for each 20 acres of the placer claim or portion thereof. For example, if a placer claim is 40 acres, the annual payment would be $330.

[46]*See* Omnibus Appropriations Act, 2009, Pub. L. No. 111-8, 123 Stat. 524, 701.

[47]If BLM offered the lease competitively, the rates are in the notice of lease sale. If a leaseholder applied for a noncompetitive lease, BLM sends a royalty rate schedule for the leaseholder's concurrence and signature before it issues the lease.

phosphate.[48] According to BLM officials, in fiscal years 2018 and 2019, the royalty rates for hardrock minerals managed under the leasing system ranged from 2 percent to 10 percent.[49] In addition to paying federal royalties, mine operators may also pay other state royalties and taxes that function similar to a royalty.

Operators also pay a variety of fees under the leasing system, which may include rents, bonuses, and other payments. For example, in terms of rental payments, operators pay a minimum of $20 per permit or lease and annual rental rates for prospecting permits and hardrock leases of $.50 and $1 per acre, respectively.[50]

Under the hardrock leasing system on Forest Service-managed lands, Interior's Office of Natural Resources Revenue disburses 25 percent of hardrock mineral royalties and fees to the state where the leased land is located or deposits were derived and 75 percent to the Forest Service. Operators may pay BLM additional fees, such as for processing prospecting permits and applications for preference right leases. These processing fees are not set at a fixed price, but instead vary based on the actual costs that BLM incurred to process the application.

Stakeholder Views about System Advantages and Disadvantages

Location system. Some stakeholders said the absence of federal royalty payments on minerals produced under the location system can be a financial advantage to operators. In addition, some industry stakeholders said that an advantage of the location system is that the annual claim maintenance fees generate revenue for BLM and the Treasury. According to BLM officials, in fiscal year 2019, of the approximately $71 million collected in claim fees, Congress authorized BLM to retain about $40

[48]For coal, the minimum royalty rate is 12.5 percent of the value of the coal removed from a surface mine and 8 percent of the value of coal removed from an underground coal mine. For phosphate, mine operators must pay a royalty of at least 5 percent of the gross value of the output of phosphates or phosphate rock and associated or related minerals.

[49]According to BLM officials, the rates are determined based on various factors by comparing royalty rates against private or state mineral estate rates as well as consideration of whether the material is mined via underground or surface techniques.

[50]These rates were established by regulation in 43 C.F.R. § 3504.15, and are not periodically reviewed and updated, according to BLM officials.

million for its Mining Law Administration Program operations, including the cost of administering the mining claim fee program.

Leasing system. Some public interest stakeholders said an advantage of the leasing system is the collection of royalties because it provides a financial return to the federal government and taxpayers for publicly owned mineral resources. In fiscal year 2018, operators with leases for hardrock mining on federal lands paid about $8.7 million in federal royalties for the seven leasing operations in production that year.[51]

Areas for Improvement That Stakeholders Identified in the Management of Hardrock Mining on Federal Lands

Stakeholders identified areas for improvement in the management of hardrock mining on federal lands in three broad categories: environmental stewardship, governance and transparency, and administrative resources. The areas that stakeholders identified generally applied to the overall improvement of management of hardrock mining on federal lands, not to a specific system used to manage hardrock mining. In a few instances, we highlight areas for improvement that stakeholders identified as specific to one particular system.

Environmental Stewardship

Regarding environmental stewardship, stakeholders identified the following areas for improvement: mitigating and minimizing environmental impacts, addressing the legacy of abandoned hardrock mines, and ensuring adequate financial assurances for reclamation.

Mitigating and Minimizing Environmental Impacts

Some stakeholders identified mitigating and minimizing environmental impacts as an overall area for improvement. Specifically, some public interest stakeholders and officials from the Tohono O'odham Nation said that agencies should take steps to better address mining impacts to water. Others noted there should be greater adoption of new technologies or approaches to mining. Regarding water, some stakeholders suggested

[51]GAO-20-461R.

the need to better address the long-term impacts that mining poses to water quality. They identified compromised water quality as among the most detrimental environmental impacts from mining because the associated downstream effects can persist even after a mine has closed, and sometimes in perpetuity. For example, according to the National Research Council's 1999 Hardrock Mining report (1999 National Research Council mining report), hardrock mining can cause a number of significant long-term impacts to surface water and groundwater quality through the release of metals and chemicals such as sulfate, cyanide, and nitrates, risking human health as well as harming animals and plants.[52] However, according to one stakeholder, environmental impact statements, which the agencies prepare when considering whether to approve a proposed mine, often seem to underestimate the impacts of mining on water quality.

A public interest stakeholder suggested that federal agencies not approve any proposed mine project on federal lands that would require perpetual water treatment. Perpetual water treatment involves the collection and treatment of water contaminated by mining discharges in perpetuity. In some cases, permits have been granted for mining discharges, such as acid mine drainage, that required costly treatment long after the mines

Expense of Perpetual Water Treatment

In 2011, the state of Colorado completed construction of an $18 million water treatment plant to conduct perpetual water treatment of mining discharge from the Summitville Mine, which closed in 1991 and was located on patented land surrounded by the Rio Grande National Forest. The state pays an estimated $2 million per year to maintain treatment.

In 2019, Colorado enacted a law generally prohibiting proposed hardrock mine projects that would require water treatment in perpetuity. Specifically, HB19-1113 provides that, subject to exception, a reclamation plan for a new or amended permit must demonstrate, by substantial evidence, a reasonably foreseeable end date for any water quality treatment necessary to ensure compliance with applicable water quality standards.

Tanks treating mining discharge at a perpetual water treatment plant.

Source: BrightLights78/stock.adobe.com. | GAO-21-299

[52]National Research Council, *Hardrock Mining on Federal Lands.*

have ceased to operate and reclamation has occurred.[53] Acid mine drainage (or acid rock drainage) occurs when mineral deposits containing sulfides are excavated during mining, and exposed to air and water. The sulfides in the exposed rock react with the oxygen and water to create sulfuric acid, which leaches other harmful metals from the surrounding rock. BLM officials noted that the agency may require operators to establish long-term water treatment trust funds. Specifically, BLM regulations provide that when BLM identifies a need for it, operators must establish a trust fund or other funding mechanism available to BLM.[54] Such mechanisms are to ensure the continuation of long-term treatment to achieve water quality standards and for other long-term, postmining maintenance requirements.

Regarding new technologies and approaches to mining, a public interest stakeholder and officials from a county government said that adopting new technologies or alternative approaches could help mitigate the environmental effects of mining. For example, one stakeholder said that to reduce the likelihood of damage to watersheds in certain landscapes, rather than using dams and ponds to store mine tailings (the material that remains once rocks are crushed and the metals are extracted), some operators began using dry stacking to store tailings. In this storage method, mine tailings are placed and compacted in a mound with native soil and vegetation for reclamation. Another stakeholder noted that shifting from open-pit mining to underground mining could help reduce environmental impacts in some situations. For example, underground mines tend to result in less surface disruption, as well as less waste rock, than open-pit mining.[55] In an effort to reduce environmental impacts from mining, some states also passed laws banning certain mining practices. For example, in 1998 Montana voters passed a ballot initiative, which became law, to ban cyanide heap leaching—a low cost method of extracting gold and silver from low-grade deposits.[56]

[53]This treatment can include pumping water from a mine to a treatment facility off-site and pumping it back to the mine, in order to comply with federal and state water quality standards.

[54]43 C.F.R. § 3809.552(c).

[55]Given the cost and technical challenges of underground mining, not all mineral deposits are conducive or economically viable for development by underground mining methods.

[56]*See* Mont. Code Ann. § 82-4-390.

Addressing the Legacy of Abandoned Hardrock Mines

Some stakeholders identified addressing the legacy of abandoned hardrock mines—that is, mine facilities developed before the advent of modern environmental laws and regulations beginning in the 1960s—as an area for improvement. Specifically, some public interest stakeholders, as well as officials from the Tohono O'odham Nation and the Nez Perce Tribe, said that abandoned mines pose various challenges, and some suggested establishing federal funding sources for abandoned mine reclamation. Regarding challenges, some stakeholders told us they have concerns about the risks posed by the large number of abandoned mines on federal lands across the western United States, with one highlighting the costs of cleaning up these mines. As noted earlier, unsecured mine tunnels and other features associated with abandoned mines may cause physical safety hazards as well as environmental degradation, such as by draining highly acidic water into soil and streams.[57] Officials from the Nez Perce Tribe said that abandoned mines continue to expose indigenous communities to toxic metals and other pollutants. For example, as we

[57]According to our 2020 report, of the 140,652 total abandoned hardrock mining features identified in the Forest Service, BLM, the Park Service, and Environmental Protection Agency databases, as of May 2019, about 89,000 features are known to pose or may pose a physical safety or environmental hazard. However, officials estimated there could be more than 390,000 abandoned hardrock mine features on federal lands that agencies have yet to capture in their databases that could contribute to federal environmental liabilities. Since 2017, GAO has identified the federal government's environmental liabilities as a high-risk issue, in part because they represent the fourth-largest liability on the federal government's financial statements and because of continued growth in these liabilities. See GAO, *Abandoned Hardrock Mines: Information on Number of Mines, Expenditures, and Factors That Limit Efforts to Address Hazards*, GAO-20-238 (Washington, D.C.; Mar. 5, 2020); and GAO, *High-Risk Series: Dedicated Leadership Needed to Address Limited Progress in Most High-Risk Areas*, GAO-21-119SP (Washington, D.C.: Mar. 2, 2021). GAO's High Risk Series identifies federal programs and operations that are high risk due to their vulnerabilities to fraud, waste, abuse, and mismanagement or that need transformation.

reported in 2019, the Formosa Mine in Oregon, a former copper and silver mine, has discharged millions of gallons of acid rock drainage and toxic metals into watersheds near the Cow Creek Band of Umpqua Tribe of Indians.[58]

According to a public interest stakeholder, the cost of cleaning up these abandoned mines is significant. Paying for cleanup can create a financial burden for the public if no private entity is available to pay for the cleanup—for example, if the operator who abandoned the mine is deceased, the mining company has dissolved, or a parent company has declared bankruptcy.[59]

Some stakeholders suggested establishing federal funding sources to pay for reclamation of these abandoned mines. For example, a public interest stakeholder suggested that hardrock mining royalties be used to fund cleanup of abandoned mines. Some public interest stakeholders and an official from the Tohono O'odham Nation suggested establishing a dedicated source of funding to address these hardrock mining cleanup efforts. For example, a dedicated source of funding might be similar to the Abandoned Mine Reclamation Fund for coal funded by a reclamation fee assessed on each ton of coal produced.[60] The 1999 National Research Council mining report stated that absent a mechanism to fund these cleanup efforts, the continued cost of abandoned mines will be paid by the public.[61] Members of the expert meeting that we convened with the assistance of the National Academies also discussed issues related to reclamation of abandoned mines and, after a thorough discussion, established consensus that Congress should address hardrock abandoned mine cleanup and associated liabilities. For more information about their discussion of this issue, see appendix II.

The Financial Legacy of Abandoned Mines

As we reported in March 2020, the Bureau of Land Management and the Forest Service, along with other federal agencies, 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. Of this total, about $1 billion was reimbursed by private parties, such as former mine owners. Federal officials estimated that it would cost billions more to address these mines in the future, contributing to federal environmental liabilities.

In contrast to abandoned hardrock mines, abandoned coal mines have a specific cleanup program. The Surface Mining Control and Reclamation Act of 1977, as amended, established the Abandoned Mine Reclamation Fund. The fund uses fees paid by present-day coal mining companies to conduct reclamation of coal mines abandoned before 1977, helping address physical safety and environmental hazards.

Warning sign for hole remaining from abandoned mine in Arizona.

Source: Richard Wright/Danita Delimont/stock.adobe.com. | GAO-21-299

[58]GAO, *Superfund: EPA Should Improve the Reliability of Data on National Priorities List Sites Affecting Indian Tribes*, GAO-19-123 (Washington, D.C.: Jan. 23, 2019). According to BLM officials, the site is primarily located on private land holdings.

[59]Our 2005 report addressed challenges associated with environmental liabilities, including the challenge of securing cleanup costs from liable parties when a parent company has declared bankruptcy. See GAO, *Environmental Liabilities: EPA Should Do More to Ensure That Liable Parties Meet Their Cleanup Obligations*, GAO-05-658 (Washington, D.C.: Aug. 17, 2005).

[60]*See* 30 U.S.C. § 1231.

[61]National Research Council, *Hardrock Mining on Federal Lands.*

Financial Assurances for Reclamation

Some stakeholders identified financial assurances for reclamation as an overall area for improvement. Specifically, some public interest stakeholders, as well as officials from the Tohono O'odham Nation and the Nez Perce Tribe, said that additional actions should be considered to ensure adequate financial assurances are available for reclamation associated with hardrock mining activity. BLM and the Forest Service require mining operators to provide financial assurances, such as cash or certificates of deposit, to help ensure that reclamation occurs if mine operators fail to do so.

Some public interest stakeholders and officials from the Nez Perce Tribe suggested that agencies increase the financial assurance amounts, as, in their view, they are often inadequate. An official from the Environmental Protection Agency (EPA) said that the EPA's comments on reclamation bonding for mine plans often indicate that reclamation costs have been underestimated and are insufficient.[62] According to the official, when such insufficiencies are not addressed, significant future environmental liabilities can be created, particularly given the liabilities of large-scale mining operations that are common today.[63]

In contrast, an industry stakeholder and officials from a county government reported that, in their experience, financial assurances are generally adequate, with sufficient amounts to cover future reclamation needs. In particular, one industry stakeholder noted that, since the 1990's, there has been an evolution in financial assurances and that agencies have improved requirements for financial assurances. According to BLM officials, the agency's surface management regulations

[62]The EPA's primary role in hardrock mining management is limited to reviewing and providing comments on environmental assessments and environmental impact statements for NEPA reviews conducted on proposed mining operations. When an action, such as a proposed mine on BLM and Forest Service-managed lands requiring agency approval, triggers an environmental impact statement under NEPA, the EPA is required to comment on it. This includes providing comments on the environmental impact statement's reclamation bonding for mine plans. The agencies, however, do not have to address EPA's comments, according to an EPA official.

[63]BLM officials noted that financial assurance amounts are based on the proposed surface disturbance and not on unforeseeable events (worst-case scenarios). Further, financial assurances cover actions that a prudent operator would conduct. The agencies are to prevent unnecessary or undue degradation of public lands by operations authorized by the mining laws, and operators are to reclaim disturbed areas; therefore, financial assurances must cover the estimated cost to reclaim operations, according to the reclamation plan.

contain robust reclamation and financial assurance requirements. We reported in 2019 that data are insufficient to determine whether financial assurances held by the Forest Service are adequate and, while BLM monitors whether assurances are adequate, it does not always identify whether corrective actions are needed to address operations with financial assurances that are inadequate.[64] In May 2020, BLM officials stated that they would implement revisions to identify where corrective action plans are needed.

Governance and Transparency

Regarding governance and transparency, stakeholders identified the following areas for improvement: mine plan approval and permitting, tribal government consultation and consent, public engagement, balancing competing uses of federal land, and federal royalties.

Mine Plan Approval and Permitting

Some stakeholders identified mine plan approval and permitting as an area for improvement. For example, some industry stakeholders said mine plan approval and permitting timeframes should be reduced. Some stakeholders said these processes are lengthy and bureaucratic and, in their experience, can take 7 to 10 years to complete.[65] In addition, one stakeholder said that reducing approval and permitting times could help facilitate domestic mineral production and reduce reliance on foreign minerals. According to the 2019 Department of Commerce report on critical mineral strategy, the mine plan approval and permitting process

[64]See GAO, *Hardrock Mining: BLM and Forest Service Hold Billions in Financial Assurances, but More Readily Available Information Could Assist with Monitoring*, GAO-19-436R (Washington, D.C.: Sept. 18, 2019).

[65]In 2016, we reported that because an operator cannot generate revenue until the mine plan review process has been completed and the mine has been constructed, mine operators typically seek to expedite the time it takes to complete this process so that they may begin to recoup their costs. We found that the average mine approval process took about 2 years, but could take as long as 11 years to complete. We made recommendations to the Departments of Agriculture and the Interior to help address the challenges of the mine plan review process, which they have partially implemented. See GAO, *Hardrock Mining: BLM and Forest Service Have Taken Some Actions to Expedite the Mine Plan Review Process but Could Do More,* GAO-16-165 (Washington, D.C.: Jan. 21, 2016).

for mineral exploration and development is often time-consuming and can delay projects.[66]

Some industry stakeholders offered other suggestions for improving mine plan approval and permitting activities. For example, one industry stakeholder suggested that rather than using environmental impact statements or environmental assessments for each individual mining project, agencies increase the use of programmatic environmental impact statements.[67] Another suggested that the Forest Service should adopt the notification approach that BLM uses for exploration activity occurring on 5 acres or less. The 1999 National Research Council mining report made a similar recommendation.[68] However, as of June 2021, the agency has not proposed such a revision to its regulations. According to Forest Service officials, the Forest Service is currently in the process of reviewing its regulations with respect to locatable operations, which have not been significantly revised since 1974.

Tribal Government Consultation and Consent

Some stakeholders identified federal agencies' tribal consultation efforts and requiring consent as areas for improvement. Specifically, officials from the Tohono O'odham Nation and the Nez Perce Tribe, and some public interest stakeholders said that meaningful tribal consultation and obtaining tribal consent, regarding hardrock mining in general, could help ensure that agencies fulfill their obligation to tribal governments. Regarding consultation, officials from the Nez Perce Tribe said that agencies are required to engage in timely and meaningful consultation with tribes on proposals that may affect tribal rights and interests, but that, in their experience, agencies do not do so. A public interest stakeholder noted that, from the stakeholders' perspective, consultation occurs too

[66]Department of Commerce, *A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals.*

[67]The term programmatic describes any broad or high-level NEPA review. Such reviews assess the environmental impacts of proposed policies, plans, programs, or projects for which subsequent actions will be implemented either based on the programmatic environmental assessment or EIS, or based on subsequent NEPA reviews tiered to the programmatic review (e.g., a site- or project-specific document). Programmatic NEPA reviews are often used by federal agencies when the actions under a specific program are routine actions done repeatedly and are therefore likely to have similar impacts that can be evaluated at a broad scale.

[68]National Research Council, *Hardrock Mining on Federal Lands.*

late in the process and that federal agencies often ignore tribal input. Tribal consultation is the process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement.[69] Officials from the Nez Perce Tribe said that consultation is intended to honor tribal sovereignty and protect tribal rights and interests. The federal government's obligations to tribes are not limited to mining operations that occur on Indian lands; such obligations also apply to off-reservation activities that occur on public lands that affect Indian treaty rights, cultural resources, or other interests.[70]

Regarding tribal consent, a public interest stakeholder and officials from the Nez Perce Tribe suggested that agencies should be required to obtain consent from tribes before hardrock mining can occur on federal lands within a tribe's aboriginal area. Specifically, officials from the Nez Perce Tribe suggested that mining not occur in these areas without free, prior, and informed consent from the tribe or tribes. They noted that such a requirement would be consistent with the federal government's longstanding policies regarding advancing tribal sovereignty and self-determination. However, federal law does not require federal agencies to obtain tribes' consent to hardrock mining on federal lands.

Officials from the Nez Perce Tribe and a public interest stakeholder referred to the 2007 United Nations Declaration on the Rights of Indigenous Peoples in addressing tribal consultation and consent. The Declaration calls for states to "consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them."[71] In endorsing the declaration in 2010, the White House issued a statement of support, stating that it understood the declaration's provisions on "free, prior and informed consent" to call for a process of meaningful consultation with tribal leaders, but not necessarily the agreement of those leaders, before the actions addressed in those consultations are taken. The statement said that the United States

[69]GAO, *Tribal Consultation: Additional Federal Actions Needed for Infrastructure Projects,* GAO-19-22 (Washington, D.C.: Apr. 19, 2019).

[70]National Research Council, *Hardrock Mining on Federal Lands.*

[71]G.A. Res. 295, U.N. GAOR, 61st Sess., U.N. Doc. A/Res/61/295 (2007). In 2007, the United States voted against this resolution on the day of its adoption but subsequently endorsed the declaration in 2010.

intended to continue to consult and cooperate in good faith with federally recognized tribes in accordance with federal law and executive directives.

Public Engagement

Some stakeholders identified public engagement as an overall area for improvement. Specifically, some public interest stakeholders and officials from the Tohono O'odham Nation said agencies should take steps to increase public access to information about mining activities and to increase opportunities for public input. Regarding public access to information, some stakeholders said it was difficult for them to access information about mining activity. For example, a stakeholder said that at a public meeting about gold exploration plans in the Black Hills National Forest in South Dakota, agency officials shared information about the number of exploration applicants, but did not share any details specific to those plans. Forest Service officials told us the agency is committed to a transparent process when authorizing plans of operations and that the agency makes information about proposed plan of operations and associated NEPA analysis available on the agency's online schedule of proposed actions. Officials from a county government noted that information about early exploration activity for projects authorized under the location system can be hard to obtain, in part because, as noted earlier, activity may begin without agency authorization and, thus, the agency may not have much information to share.[72]

In addition, some stakeholders said that although mining operators generally share information about the benefits of mining activities, they are not always transparent about the risks associated with those operations. Specifically, some public interest stakeholders and officials from the Tohono O'odham Nation said that mining companies should better communicate the impacts of proposed mines to communities. One said that operators typically share information about the benefits of proposed mines, such as job creation, but not about the risks of mining, such as the potential environmental impacts. For example, regarding a proposed mine in Arizona, officials from the Tohono O'odham Nation said the mine operator shared anticipated financial benefits of a proposed mine with the community but did not communicate potential risks. The

[72]While this is the case for casual use activities on BLM land, the operator is required to submit a notice or plan of operations to BLM if the operation will result in surface disturbance exceeding casual use. Plan-level operations on BLM lands require BLM approval before operations can begin.

approved mine ultimately resulted in radioactive groundwater contamination and fugitive dust, which negatively affected the water and air quality of the nearby reservation.[73]

Regarding public input on mining activities, some stakeholders suggested that there be more opportunities throughout the lifecycle of a mine for the public to provide formal comment to agencies. Officials from a county government suggested that the public's ability to provide comments under the location system could be improved through earlier notification of notice-level mining activity. Some public interest stakeholders also suggested that agencies consider public comments more seriously during the decision-making process, particularly from those directly affected by mining activity. While a public interest stakeholder said that agencies do not adequately consider comments from the local community, one public interest stakeholder noted that, in his experience, agencies generally give serious consideration to comments that are technical in nature. Officials from BLM and the Forest Service noted that the agency considers all input but responds to comments that might require additional review.

Balancing Competing Uses of Federal Lands

Some stakeholders identified balancing the competing uses of federal lands as an area for improvement. Stakeholder views of potential improvements in this area varied, with some suggesting reducing the amount of lands withdrawn from mineral entry, and others suggesting that mining on federal lands not be given priority over other uses. In addition, some stakeholders suggested permanently ending the practice of patenting to convey title to federal lands under the location system.

Regarding federal lands withdrawn from mineral entry, some industry stakeholders said that agencies should evaluate them to determine whether some of these lands can once again be available for mineral entry under the location system. As noted, the Secretary of the Interior may temporarily withdraw federal lands, effectively removing an area from location or entry—that is, prohibiting the location of new mining claims—for purposes such as maintaining other public values in the area or reserving the lands for a particular public purpose or program. According to some industry stakeholders, too much federal land has been withdrawn and is unavailable for mining activity, noting specifically that withdrawals

[73]Fugitive dust refers to emissions of solid, airborne particulate matter from indoor or outdoor processes, including mining activities such as drilling, truck loading/unloading, and haul roads, etc.

limit the search for viable mineral deposits. Another industry stakeholder said access to withdrawn lands could help support the development of critical minerals, minerals that are increasingly used in clean-energy technology, telecommunications, and other areas.

According to BLM officials, more than 50 percent of the federal mineral estate is currently withdrawn from access for mining activity. Under the Federal Land Policy and Management Act of 1976, agencies are to periodically assess withdrawn lands to determine whether withdrawal is still appropriate.[74] BLM officials said they periodically conduct such assessments and that between fiscal years 2014 and 2016 BLM's assessment of 21 withdrawals resulted in BLM revoking eight withdrawals. However, some public interest stakeholders stated that certain federal lands should be closed to hardrock mining, including areas of environmental significance or sensitivity. For example, one stakeholder said that, given the potential negative impacts of mining on water, areas of hydrological sensitivity should be restricted from hardrock mining.

Regarding mining as a priority on federal lands, some public interest stakeholders and officials from the Nez Perce Tribe suggested that hardrock mining not be given priority over other potential uses of federal lands, including recreation and wildlife. According to a stakeholder, the preferential status of hardrock mining under the location system should be reduced, and another said hardrock mining should be treated fairly and equitably among other uses. Instead, a stakeholder said agencies would not deny a proposed mining operation under the location system even when an agency concludes mining will be unsuitable in a certain location. Some stakeholders also said that agencies would not generally deny a proposed mine under the leasing system after obtaining a preference right lease.

According to Forest Service officials, the Forest Service cannot deny a "reasonable plan" of operation submitted under the agency's regulations for locatable minerals. A Forest Service official told us that the agency describes a reasonable plan as one that is logical and sequential and that includes technical processes that comport with industry practices. If such a plan is proposed, the agency must approve it so long as the proponent agrees with all agency mitigation measures. According to BLM officials, BLM does not have the discretion to deny or reject mining operations on

[74] 43 U.S.C. § 1714(f).

lands open to operation under the location system, except to the extent that such operations would result in unnecessary or undue degradation of public lands.[75] If the proposed operations in the plan would cause such degradation, BLM is to coordinate with the applicant to ensure degradation is prevented. If the applicant is unwilling or unable to prevent such degradation, then BLM can deny or reject a mine plan of operations. However, denying a plan is rare. The most recent denial of a mine plan that BLM identified was in 2001 when it denied the Imperial Mine plan in California because the applicant could not mitigate unnecessary and undue degradation.

Regarding patenting of federal lands under the location system, some public interest stakeholders and officials from the Nez Perce Tribe said the 1872 Mining Law should be amended to permanently end this practice. As previously noted, under the location system, patenting allows for the full title of both the land and mineral rights of a claim to be transferred from the federal government to a private entity or individual. Once a patent is issued, the government no longer has title to the minerals or land. Although Congress has put in place a series of 1-year moratoriums on the issuance of mineral patents through provisions in annual appropriations acts since fiscal year 1995, without a permanent end to patenting, the practice could resume in the future. Officials from the Nez Perce Tribe said patenting can have significant negative consequences for tribes, as the privatization of public lands could restrict or prohibit a tribe's continued access to important sacred sites on public lands and impair or extinguish altogether a tribe's treaty rights to hunt, gather, pasture animals, and travel. We previously recommended that Congress amend the 1872 Mining Law to eliminate patenting of both hardrock minerals and the land required to mine them, noting that the patent provision of the 1872 Mining Law runs counter to other national natural resource policies and legislation.[76] Additionally, we reported that patenting the land and minerals is not essential for mineral exploration and development, as other provisions of the law provide the right to use the land for mineral development and sale without the federal government relinquishing title to the land.

[75]As noted previously, under the Federal Land Policy and Management Act of 1976, BLM is to take any action necessary to prevent unnecessary or undue degradation of public lands. 43 U.S.C. § 1732(b).

[76]GAO, *Federal Land Management: The Mining Law of 1872 Needs Revision,* GAO/RCED-89-72 (Washington, D.C.: Mar. 10, 1989).

Federal Royalties

Some stakeholders identified federal royalties as an area for improvement. Specifically, some public interest stakeholders said that royalties should be collected for all hardrock minerals produced, not just for hardrock minerals produced under the leasing system. A public interest stakeholder noted that royalties—a percentage of the quantity or gross value of the output of the minerals produced—provide for a return to the federal government and taxpayers. An industry stakeholder, however, stated that collecting royalties for hardrock mining production could reduce overall mining activity and investment in mining, and might not ultimately generate much income for the federal government. Additionally, officials from a county government noted that instituting a federal royalty payment for minerals produced under the location system might decrease state revenues from mineral royalties. For example, the stakeholder noted that in Nevada, operators may deduct federal royalties paid for mineral production from the amount owed in state royalties. At various points in recent decades, Members of Congress have introduced legislation proposing to adopt a royalty for hardrock minerals produced under the location system, but as of May 2021, no such proposals have been enacted.

Administrative Resources

Regarding administrative resources, stakeholders identified agency staffing and Forest Service cost recovery as areas for improvement.

Agency Staffing

Some stakeholders identified staffing at federal agencies as an overall area for improvement. Specifically, some industry and public interest stakeholders, and BLM officials, said greater mineral staff expertise, as well as an appropriate level of staffing, could improve overall agency management of hardrock mining activity. Regarding staff expertise, some industry stakeholders said that agencies should have more staff with experience in minerals management. According to some industry stakeholders, not all agency staff have experience working in hardrock mining, which requires technical expertise. One stakeholder said that this situation complicates timely completion of environmental reviews and assessments. The 2019 Department of Commerce report on critical mineral strategy stated that BLM and the Forest Service face challenges in recruiting and retaining a trained workforce, including biologists,

archaeologists, geologists, and engineers, which can cause delays in reviewing mining projects.[77] Agency officials from the Forest Service highlighted that there has been a lot of movement of experienced staff within the agency, including retirements, which may contribute to staffing challenges. According to BLM officials, BLM hardrock mining staff have technical expertise and although the agency provides staff with ongoing training, BLM officials said it could benefit from improvements in training for staff working in the agency's hardrock mineral management programs.

Additionally, some industry and public interest stakeholders, and BLM officials, suggested that agency management of hardrock mining could benefit from adequate staffing. According to one stakeholder, maintaining an appropriate level of staffing is key but the agencies do not always have enough staff to oversee programs and conduct timely reviews of mine plans.[78] For example, officials from a county government said agencies should have enough staff to implement the NEPA process more efficiently, citing that many NEPA and permitting backlog issues appear to be related to insufficient staffing. Members of the expert meeting that we convened with the assistance of the National Academies also discussed issues related to agency staffing and administrative resources and, after a thorough discussion, reached consensus that adequate financial and human resources are essential to administering efficient, fair, credible, and transparent federal agency oversight of mineral activities. For more information on their discussion about this issue, see appendix II.

Forest Service Cost Recovery

The Forest Service identified cost recovery as an area for improvement for the agency. Specifically, Forest Service officials said that a mechanism for cost-recovery at the agency, whereby the Forest Service could recover costs incurred for reviewing and processing mining plans of operations, should be implemented. Unlike BLM, which has the authority to both charge and retain, as a deposit with the Treasury in a special account, fees to reimburse the United States for certain reasonable costs,

[77]Department of Commerce, *A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals*.

[78]BLM officials noted that a timely review is dependent upon the submission of complete and accurate information from the mine operator. If an operator does not submit adequate information, it can affect the length of time to process mine plans unrelated to the staffing levels in the agency.

including its costs for preparing an EIS,[79] the Forest Service largely relies on annual appropriations for conducting those reviews. Although the Forest Service has the authority to establish a fee structure for reviewing proposed mine plans through rulemaking,[80] according to Forest Service officials, it has not done so and does not have the authority to retain these fees as BLM does. According to the Forest Service, having a mechanism to recover its costs from operators could aid in helping to ensure that the agency reviews only those plans of operators with serious or viable operations.

In 2016, we recommended that the agency issue a rule that establishes a fee structure for hardrock mine plan processing activities and request authority from Congress to retain any fees it collects.[81] According to Forest Service officials, the agency expects to issue a proposed rule in 2022 to collect fees. If the rule is implemented, the collected fees will need to be deposited in the U.S. Treasury's General Fund unless the Forest Service also obtains the congressional authority it has requested to retain those fees.

Agency Comments

We provided a draft of this product to the Departments of Agriculture and the Interior for review and comment. We received technical comments from the Forest Service, on behalf of the Department of Agriculture, and from the Department of the Interior, which we incorporated as appropriate.

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 Secretary of Agriculture, the Secretary of the Interior, 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 gaffiganm@gao.gov. Contact points for our

[79]*See* 43 U.S.C. § 1734.

[80]*See* 31 U.S.C. § 9701.

[81]GAO-16-165.

Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix III.

Sincerely yours,

Mark E. Gaffigan
Managing Director, Natural Resources and Environment

Appendix I: Description of Stakeholders Included in Review

Table 3 includes descriptions of the stakeholders we interviewed as part of our review of the advantages and disadvantages of the systems agencies use to manage hardrock mining on federal lands, and considerations for improvement in management of hardrock mining on federal lands.

Table 3: Stakeholders and Stakeholder Groups Included in GAO's Review

Alan Anderson—A retired engineer whose professional experiences have included work with the U.S. Forest Service, including as District Ranger, Buffalo Gap National Grassland; Forest Engineer, Nebraska National Forests and Grasslands; and Roads Engineer, Black Hills National Forest. He has also held numerous positions as an engineering supervisor, hydrographic surveyor, and mariner while a commissioned officer with the National Oceanic and Atmospheric Administration, and underground miner at the Homestake Gold Mine in Lead, South Dakota.
American Exploration & Mining Association (AEMA)—A national association representing the minerals industry. According to AEMA, the association is a recognized voice for exploration, the junior mining sector, and for maintaining access to public lands. AEMA represents the entire mining life cycle, from exploration through production to reclamation and closure.
Black Hills Clean Water Alliance—A regional organization whose mission is to stop current and prevent future radioactive and destructive mining in the Black Hills region of South Dakota to protect valuable resources – especially water – for future generations. According to the alliance, the organization is a diverse collection of citizens concerned about the health, environmental, and economic impacts that mining projects would have on communities, people, the economy, and natural resources.
Earthworks—An organization dedicated to protecting communities and the environment from the adverse impacts of mineral and energy development while promoting sustainable solutions. According to Earthworks, the organization stands for clean air, water, and land; healthy communities; and corporate accountability.
Eureka County, Nevada officials—J.J. Goicoechea is the Eureka County Commissioner; Jake Tibbitts the Natural Resources Manager for Eureka County; and Tate Else the Superintendent of Eureka County schools. Eureka County has extensive hardrock mining, and Bureau of Land Management (BLM) manages about 80 percent of the land in the county.
Roger Flynn—Founding Director and Managing Attorney of the Western Mining Action Project (WMAP), a nonprofit public interest law firm specializing in hardrock mining and related public land and environmental laws. WMAP represents conservation groups and Native American groups and tribes before federal and state courts on project-specific mining litigation, administrative permitting disputes, and litigation over state and national mining regulations. Mr. Flynn is also an Adjunct Professor at the University of Colorado School of Law, teaching courses in Natural Resources Law and Mining and Mineral Development Law.
Idaho Conservation League—A nonprofit organization whose mission is to create a conservation community and pragmatic, enduring solutions that protect and restore the air, the water, and land and wildlife. Its vision is to have an Idaho where public lands remain public and are well managed; the air is clean; lakes and rivers are healthy; fish and wildlife thrive; and a prosperous, sustainable future exists for all Idahoans.
John Leshy—A Professor Emeritus at the University of California, Hastings College of the Law in San Francisco. Before joining the Hastings faculty in 2001, Mr. Leshy was Solicitor (General Counsel) of the Department of the Interior throughout the Clinton administration, and Associate Solicitor in the Carter administration. Mr. Leshy has published widely on constitutional law, public lands, water and other natural resources issues, including books on the 1872 Mining Law and the history of public lands.

Mining Minnesota—A state organization committed to sustainable and environmentally responsible mining of copper, nickel, and precious metals. According to Mining Minnesota, the organization is driven by a diverse coalition of organizations, companies and individuals and works with local citizens, businesses, and other organizations to bring growth and job creation to the state through responsible development of natural resources. Mining Minnesota also seeks to provide the facts about mining of copper, nickel, and precious metals in Minnesota and offer a way for people to get involved and show support.
Montana Environmental Information Center—A state organization dedicated to ensuring clean air and water for Montana's future generations. The center raises public awareness and understanding of key environmental issues in Montana and influence state and federal agencies, monitoring issues from energy development and climate change to standards for hardrock mining, to air and water pollution permits.
Francis McAllister—Vice President of Land & Water for Freeport-McMoRan since 2013. In this role, Mr. McAllister is responsible for managing the company's global land positions, including land strategy; all land acquisitions, divestments, and exchanges; managing state and federal mining leases and claims; and overseeing the relationships with federal and state land agencies. Mr. McAllister is also Chairman of the Arizona Mining Association, a position he has held since 2011.
Dr. Glen Miller—A retired Professor Emeritus of Natural Resources and Environmental Science at the University of Nevada, Reno and former Director of the Graduate Program in Environmental Science. Dr. Miller has also been active on mining policy issues and was a member of the Board of the Environmental Law Alliance Worldwide and of Earthworks. He also is a member of the Center for Science in the Public Interest, Great Basin Resource Watch, and is Chair of the Board of Directors of the Great Basin Institute.
National Mining Association—A national association whose mission is to build support for public policies that will help Americans fully and responsibly benefit from the abundant domestic coal and mineral resources in the United States. Its objective is to engage in and influence the public process on the most significant and timely issues that impact mining's ability to safely and sustainably locate, permit, mine, transport, and utilize the nation's vast resources.
Nez Perce Tribe—A federally recognized tribe with headquarters in Lapwai, Idaho, on the 770,000-acre Nez Perce Reservation. The Nez Perce Tribe is governed by a nine-member elected body that oversees the administration of more than 25 governmental departments, programs, and tribally owned enterprises, which employ approximately 1,000 tribal and nontribal citizens. To continue the Nez Perce way of life, and pursuant to the Nez Perce Tribe's Treaty of 1855 with the United States, Nez Perce citizens exercise reserved fishing, hunting, gathering, and pasturing rights throughout their 13 million-acre traditional homeland and usual and accustomed places in what is today Idaho, Montana, Oregon, and Washington. The Nez Perce Tribe is also a co-manager of its treaty-reserved resources and works with numerous federal, state, and other partners to restore fish runs, improve habitat, and protect cultural resources on millions of acres of public lands.
Debra Struhsacker—An environmental permitting and government relations consultant who provides services to mineral exploration and mining clients. She is one of the founders of the Women's Mining Coalition and a member of the coalition's Board of Directors. Ms. Struhsacker is a hardrock mining policy expert, with over 30 years of hands-on expertise with the environmental and public land laws and regulations pertaining to mineral exploration and mine development.
The Campaign to Save the Boundary Waters—A campaign, led by the regional organization Northeastern Minnesotans for Wilderness, to protect the Boundary Waters Wilderness (in Northeastern Minnesota) from sulfide-ore copper mining. The campaign is dedicated to creating a national movement to protect the clean water, clean air and forest landscape of the Boundary Waters Canoe Area Wilderness and its watershed from toxic pollution caused by mining copper, nickel, and other metals from sulfide-bearing ore.
Tohono O'odham Nation of Arizona—A federally recognized tribe in Southwestern Arizona that includes approximately 28,000 members. The Tohono O'odham Nation is the second largest reservation in Arizona, in both population and geographical size, with a land base of 2.8 million acres, approximately the size of the state of Connecticut. The reservation borders a range of federal lands, including lands managed by BLM.

Source: GAO. | GAO-21-299

Appendix II: Expert Meeting Participants, Methodology, and Discussion Topics

This appendix describes expert meeting participants, methodology, and discussion topics of an expert meeting we held at the National Academies of Sciences, Engineering, and Medicine (National Academies) in Washington, D.C., in November 2019. This meeting of experts was planned and convened with the assistance of the National Academies to better ensure that a breadth of expertise was brought to bear in its preparation; however, all final decisions regarding meeting substance and expert participation were the responsibility of GAO.[1]

The names and affiliations of the experts who participated in the expert meeting are as follows:

- Aimee Boulanger, Initiative for Responsible Mining Assurance
- Richard DeLong, EM Strategies
- John Dobra, Natural Resource Industry Institute, University of Nevada, Reno
- Roger Flynn, Western Mining Action Project
- Roger Fragua, Cota Holdings, LLC
- John Leshy, University of California, Hastings College of the Law
- Francis McAllister, Freeport-McMoRan
- Virginia McLemore, New Mexico Bureau of Geology and Mineral Resources
- Glenn Miller, University of Nevada, Reno
- Kyle Moselle, Alaska Department of Natural Resources
- Ron Parratt, Independent Consultant

[1]We evaluated the experts for any conflicts of interest. We considered a conflict of interest to be any current, financial, or other interest that might conflict with the service of an individual because it (1) could impair objectivity and (2) could create an unfair competitive advantage for any person or organization. We determined the experts to be free of conflicts of interest, and judged the group as a whole to have no inappropriate biases.

- Deborah Peacock, Peacock Law
- David Spears, State Geologist of Virginia
- Debra Struhsacker, Independent Consultant
- Kyle Wendtland, Wyoming Department of Environmental Quality

To develop our methodology, we worked iteratively with the National Academies staff to identify experts that were (1) knowledgeable about solid and hardrock mineral management, including the location and leasing systems at the federal and state levels; (2) representative of a broad spectrum of disciplines, including land use management, law, geology, engineering, environmental science, economics, and public policy; and (3) drawn from a wide range of sectors, including government, industry, academic, and nongovernmental associations.

We developed three session topics for the 2-day meeting based on premeeting interviews with experts about what they individually considered as important to developing high-level guiding principles for mining solid minerals on federal lands.[2] The session topics included (1) mineral resource strategy; (2) environmental safeguards; and (3) governance, accountability, and transparency. At the conclusion of the 2-day meeting, a number of issues and themes emerged from the group's discussions about these topics that helped inform our understanding of mining on federal lands. Further, the experts reached complete consensus on the following three topics:

- Abandoned mines. The experts agreed on the following statement: Congress should address abandoned hardrock mine cleanup and associated liabilities. Expert meeting discussion included varying opinions about the scope of a cleanup, assigning responsibility for cleanup, and covering the costs of such efforts. For example, some experts suggested the cleanup might be undertaken by a mining company approved to remine the original site for additional minerals. Other experts, however, cautioned that remining or reclamation can cause environmental damage, such as to ground water or aquifers. Regarding responsibility for cleanup, experts discussed the

[2]For purposes of the meeting, we defined guiding principles related to mining as a set of statements that reflect broadly shared foundational values covering the environmental, economic, and social impacts along all stages of the mining lifecycle (from exploration through mine closure) that policy practitioners may consider to inform the policies governing solid mineral resources on federal lands. To be considered a "guiding principle," the group had to come to full consensus, that is, all experts agreed to the specific wording of the principle.

implications of assigning full liability for environmental cleanup for the site. Some experts suggested that making an organization fully liable for all cleanup at a site could make it difficult to pursue partial improvements to a site. Others, however, said that loosening these liabilities and requirements could put resources, such as clean water, at increased risk. Experts also noted that abandoned hardrock mine cleanup is costly, and they discussed options for covering these costs, including allocating already collected fees for this purpose and collecting new fees.

- Science-based decision-making. The experts agreed on the following statement: Regulatory agencies should consider and incorporate adequate science and engineering input in their decision-making. Discussion included varying opinions about the role of science in the decision-making process for mine activity approval on federal lands. For example, expert opinion diverged regarding the role of scientists and engineers in completing National Environmental Policy Act (NEPA) documents and whether they primarily answer to the mining companies who hire them or to the Department of the Interior's Bureau of Land Management, the Department of Agriculture's Forest Service, or other regulatory agencies whose approval is sought. Experts also discussed that members of the public offering comment during the NEPA process often have inadequate resources to challenge industry scientific analysis. In addition, experts discussed several possible approaches for addressing the issue of science-based decision-making, including ensuring that regulatory agencies have adequate scientific expertise; conducting scientific peer review by a neutral third party; and incorporating knowledge from indigenous communities.
- Resources for administration and oversight. The experts agreed on the following statement: Adequate financial and human resources are essential to administering efficient, fair, credible, and transparent federal agency oversight of mineral activities. The discussion included a recognition of the importance of appropriately staffing the offices that administer these programs to conduct agency responsibilities. Experts also discussed the importance of adequate resources for agency scientists and for data collection efforts, such as on the location of viable mineral deposits as well as the health of watersheds and other critical environmental resources. In addition, experts noted the importance of adequate staffing and resources to earn public trust by fulfilling agency responsibilities to tribes, sharing information with the public, ensuring the adequacy of financial assurances, and protecting the environment.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Mark E. Gaffigan, (202) 512-3841 or gaffiganm@gao.gov

Staff Acknowledgments

In addition to the individual named above, Nathan Anderson (Director), Anne-Marie Fennell (Director), Cardell D. Johnson (Acting Director), Casey L. Brown (Assistant Director), Ulana Bihun (Analyst-in-Charge), Jessica Blackband, Matt Elmer, Rich Johnson, Donna Morgan, Patricia Moye, Cynthia Norris, Katrina Pekar-Carpenter, Anne Rhodes-Kline, Rebecca Sandulli, Sheryl Stein, Kyle Stetler, Marie Suding, Sara Sullivan, Walter Vance, Jack Wang, and Adam Windram made key contributions to this report.

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