



Hardrock Reclamation Bonding Practices in the Western United States

Summary Report

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for the

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Forward

For more than 150 years, America's quest to locate and extract copper, lead, silver, gold and other precious metals from the mountains of the West dramatically influenced the way the region was settled and developed. We've all seen images of the California Gold Rush in the 1800s – just one example of the part that mining played in our country's Western history, a role that still affects the region today.

While Americans have enjoyed short-term economic prosperity from mining, we now know that it has come at a terrible cost. Once teeming with big game and sage grouse, the majestic mountains and rolling grasslands of the West have been ravaged by hard rock mining. The sight of waste rock dumps, tailings piles, mined pits, and tunnels into mountainsides is all too common. While these sights are alarming, historic and even present day mining operations have another less obvious, but far more ominous legacy – air and water pollution that threatens human health.

Despite more than 25 years of progress under the Clean Water Act, many Western waters remain dangerously polluted from active, inactive and abandoned mine runoff. Mining companies too often walk away from the pollution they've created, without restoring or "reclaiming" the land they've damaged, forcing taxpayers to pick up the tab for the clean-up.

This report has been produced as part of the National Wildlife Federation's (NWF) work to restore our nation's grasslands and keep the great rivers of the American West healthy for people and wildlife. It investigates why a key mechanism designed to address mine pollution problems – *Reclamation Bonding* – has proven inadequate and explores how it can be fixed.

Reclamation bonding is meant to serve as an "insurance policy" against pollution problems. It is a cache of money that mining companies are required to put down before beginning work, and which can be used for clean-up down the road, if needed. But the system is badly in need of reform.

In "*Hardrock Reclamation Bonding Practices in the Western United States*," NWF presents a new reclamation bonding model that offers a common-sense alternative to current procedures. It holds companies, not taxpayers, accountable for mining damage and works to conserve habitat and sensitive resources.

The toll that mining has taken is dramatic. But we can begin to restore our country's historic Western grasslands and waterways and to curb future damage, if we act now. This report is a tool for making those changes happen. With the help of concerned citizens, it can help us ensure a better future for people and wildlife across the west.

Mark Van Putten
President and CEO
National Wildlife Federation

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The author acknowledges the contributions by many individuals in state and federal agencies, who responded to requests for information about reclamation practices and bonding information in each of the western states.

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Author Biography

James R. Kuipers is an independent mining and environmental planning and resource management consultant. He has worked on mining and environmental project evaluations including engineering design, operational and post-operational efficiency, environmental impacts and regulatory compliance for the past 20 years. Since 1997, his primary work has been for the Center for Science in Public Participation as a consulting mining engineer providing scientific and technical expertise to grassroots public interest groups relative to mining issues. Previously, he worked for over 15 years in the mining industry as an engineer and manager at major hardrock mining projects and the senior corporate level in the U.S. and internationally. His industry experience includes technology research and development, project design, feasibility and environmental evaluations, operations management, environmental remediation and emergency response, and reclamation and closure. He received a B.S. from Montana Tech in mineral process engineering, and is a registered professional engineer in Colorado and Montana.

Comments and Questions:

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Hardrock Reclamation Bonding in the Western United States

Summary Report

Today, modern mining companies employ advances in technology that have led to massive mining operations such as those that employ open pit mining and leaching methods to exploit lower-grade ores. At the same time, the increased size, techniques used, and pro-active environmental standards have resulted in significantly increased costs to restore lands and waters damaged by mining operations, which is required to varying extent, by all the western states. In addition, all the states require some form of “reclamation bonding” to ensure that mining operations are conducted responsibly and reduce their liability in the event mining companies fail to fulfill their responsibilities.

Today's major hardrock mining operations in the western U.S. typically range in disturbance area from 100 acres to more than 10,000 acres. At the same time reclamation costs, which vary significantly from state to state and mine site to mine site, range from less than \$1,000 per acre to more than \$20,000 per acre. The total, potentially unfunded reclamation bonding liability of all the western states presently **exceeds one billion dollars**.

Table I identifies the potential unfunded liability from major hardrock mining operations, by state. At the same time, the financial failure of numerous mining companies has exposed shortcomings in both bond methods and bond amounts.

Table I

State	Potential Unfunded Liability
Alaska	\$7 - \$57 Million
Arizona	\$73 - \$292 Million
California	\$17 - \$68 Million
Colorado	\$20 - \$50 Million
Idaho	\$20 - \$160 Million
Montana	\$20 - \$50 Million
Nevada	\$96 - \$480 Million
New Mexico	too soon to tell under new rules
Oregon	no major hardrock mines in the state
South Dakota	\$6 - \$15 Million
Utah	\$10 - \$50 Million
Washington	\$5 - \$10 Million
Wyoming	no major hardrock mines in the state
Total	\$254 - 1,037 Million

American taxpayers are faced with paying for this significant liability from mines left unreclaimed, shifting the economic burden from the companies that profited from the mines and leaving environmental disasters behind for the public to clean up. The number of bankrupt or abandoned mines has increased significantly, with state and/or federal agencies presently potentially responsible for at least some portion of the cleanup costs of 13 mines in Nevada, five in Montana, and additional mines in South Dakota, Alaska, Idaho, Colorado and New Mexico. Given the potential for a major collapse within the gold and copper mining industry (as demonstrated by recent metals prices at 20-year lows), the potential for public liability of an even greater magnitude certainly exists. As a result, the relatively obscure regulatory principal of reclamation bonding has recently become more important and warrants both public and regulatory scrutiny.

Reclamation Bonding

“Hardrock Reclamation Bonding Practices in the Western United States” is a comprehensive examination of hardrock reclamation bonding as it applies to major base and precious metals mines in the western United States. It is based upon detailed examination of the existing state and federal reclamation bonding statutes and practices of the western U.S. This information is used to illustrate and compare the various features and methods used to determine reclamation and closure bonding amounts, and compare the practices employed by the various state and federal agencies in affecting reclamation and closure bonding. Based on examination of the existing state and federal practices, a regulatory model for reclamation and closure bonding is recommended, and is the basis of a critique of individual state and federal statutes and practices.

The study shows that although the basic intent of most state’s hardrock mine reclamation and closure statutes is the same, as a result of the specific rules and regulations and political influence, the practices of each state vary significantly. The estimated costs for nearly identical tasks can vary significantly between states. The lowest estimated reclamation costs exist in those states and on federal land where the statutes and regulations are general and limited in scope, and afford the regulators substantial discretion as to their interpretation and application. This observation becomes even more dramatic where industry political influence has resulted in apparent underestimation of reclamation costs. In other states the statutes and regulations are more specific and comprehensive in scope, allowing the regulators less discretion as to their use. In addition, various states have unique and explicit features or have developed specific guidelines to deal with reclamation and closure issues, usually as a result of lessons learned from adverse circumstances.

The study demonstrates reclamation and closure cost estimation as a complicated and to a great extent site-specific task. However, the information from the case studies reveals a significant disparity between the inclusion of and/or costs for various reclamation and closure activities, as well as cost estimation methods. The most significant difference in cost estimates for individual items as well as total reclamation and closure costs can be seen where the mine operator is allowed to estimate their costs, and where the estimate is performed based on the potential costs if reclamation is performed by the State. In the event the state is required to perform cleanup, an increase of costs above that estimated by the operator of from 50% to more than 500% might be expected to occur. One of the primary factors affecting reclamation and closure costs is the presence of acid mine drainage at many of the mine sites, requiring costly mitigation of related environmental impacts. At many mines the

presence of acid mine drainage is either underestimated or ignored until it becomes evident, at which time the costs often exceed the operators financial resources, leading to bankruptcy or abandonment of the site in many cases.

State and Federal Statutes and Practice

The study shows approximately 150 major hardrock metals mining operations in the western United States, with a total disturbance acreage of approximately 250,000 acres, and a reclamation and closure bonding level in total of approximately \$1.1 billion. The average bond level for all the major mines is approximately \$4,400 per acre, however the range of cost varies at the various mines studied from less than \$1,000 per acre to greater than \$50,000 per acre.

The state's statutes and regulations pertain to key areas of reclamation and closure bonding, including authority, exemptions, planning requirements, bonding requirements, oversight, public participation, and other significant features. These areas are addressed by statute in either a general manner or more explicit manner. Some state's statutes are a general prescription providing limited authority, while other state's statutes are specific and comprehensive, and provide for broader authority. The case studies graphically demonstrate the different approaches taken by the states for various mine sites and the resulting disparity in reclamation bond amounts.

A Recommended Regulatory Model for Reclamation Bonding

The recommended regulatory model that evolved from this study is based on consideration of present reclamation and closure statutes and practices in all the western U.S. states, and emulation of those statutes which best represent the fundamental overall purpose and objectives of reclamation and closure bonding. The following Recommended Principles of Reclamation and Closure Bonding summarize the recommended regulatory model.

Principles of Reclamation and Closure Bonding

- The following provisions shall be included as requirements for all reclamation and closure plans, and specific performance standards shall be adopted to guide their administration: topsoil salvage and replacement; recontouring; revegetation; slope stability; stream protection; air and water resources protection; geochemical and acid mine drainage considerations; public health and safety; wildlife habitat restoration; and aesthetic impacts, including visual impacts.
- Bonds shall be required as a part of the operating permit for the purpose of assuring completion of the reclamation and closure plan, and other requirements of any laws and rules and any permit conditions.
- State and federal agencies shall determine and set the amount of financial assurance; derive their estimate from only verifiable sources; include consideration of all costs in determining bond amounts; include adequate funding for interim reclamation and closure operations; include indirect and overhead costs; and base the cost of reclamation over the project life.

- The following forms of financial assurance shall only be accepted: (i) cash; (ii) surety bonds; (iii) letters of credit; and limited forms of other financial assurance mechanisms that are readily liquid and can be assumed as cash in the event reclamation and closure by the agencies becomes necessary. No type or variety of corporate guarantee or self-bonding shall be accepted as financial assurance.
- Regulatory agencies shall conduct at least yearly on-site inspections of existing and new mining operations and more frequently as necessary to ensure compliance with the terms of the operating permit and the approved reclamation and closure plan.
- Regulatory agencies should review the bond amount at least every five years, and more frequently as conditions warrant, and adjust the bond amount as necessary to reflect actual current conditions and reclamation and closure requirements.
- Regulatory agencies should establish closure and post-closure performance criteria to ensure compliance with applicable state and federal water and air quality standards.
- The regulatory agencies shall cause the bond to be forfeited if: reclamation and closure is not performed as permitted; reclamation and closure activities are not initiated and completed as required; if the surety refuses or fails to perform the work; and in the event the mine operator is unable to maintain the financial surety.
- Regulatory agencies should establish the formation and means to support an emergency response and reclamation action.
- Full and unrestricted public participation should be provided in the process of establishing reclamation and closure plans and bond amounts, and as a part of bond release.

Critique of State Statutes and Practices

Examination of state statutes and practices in comparison with these fundamental regulatory principles shows a wide variance in terms of the need for changes in the states and federal agencies. Arizona and Nevada by far have the weakest reclamation bonding programs – both states allow the company to estimate the cost of reclamation, allow self-bonding or corporate guarantees, and fail to adequately address acid mine drainage, water quality and other key areas. Alaska's statutes have some of the same problems, and although the state's practices result in better adherence to the recommended principles, significant changes to the statutes are recommended in order to provide the state's regulators with more authority. In a similar manner, the reclamation and bonding provisions of the BLM and U.S. Forest Service regulations are generally inadequate, and in many cases negatively compromise state statutes and practices.

In these states and with respect to the federal agencies, significant and urgent reforms are recommended.

Most other western states have comparatively better statutes and/or practices, and require less significant changes to more effectively protect the public and the environment and promote responsible mining practices. However, in all the states at least some critical flaws exist in present regulation or practice.

Because of the critical nature of these issues and the existing shortcomings as demonstrated in this study, it is recommended that all the western U.S. states reform their reclamation planning and bonding statutes and programs.

This *Summary Report* is a synthesis of the investigation into the strengths and weaknesses of existing state programs. For more information, and an in-depth analysis of hardrock reclamation bonding practices, the reader is encouraged to review the full report - “*Hardrock Reclamation Bonding Practices in the Western United States.*”

State of Alaska **Reclamation Bonding Program**

Mining statutes:

In 1963 Alaska was the first western state to establish a reclamation Act, but reclamation bonding was not required in a substantive form until 1991, when the Alaska Reclamation Act was codified. The Act was followed by the promulgation of the Mining Reclamation rules in 1991. In 1995, Laws and Regulations for Mineral Rights on State Land were established.

Lead agencies:

- The Division of Mining and Water Management of the Department of Natural Resources is the lead state agency responsible for administering the Alaska Reclamation Act.
- The Alaska Department of Environmental Conservation (ADEC) is responsible for permitting and bonding tailings ponds and heap leach facilities.
- Either the U.S. Forest Service or Bureau of Land Management, along with the ADEC and the Division of Mining and Water Management, administers mining regulations on federal lands.

Mine and bond information:

- Four major hardrock mining operations are currently permitted in Alaska. There are two gold and silver mines (one operating and one with operations suspended) and two base metals mines (both operating). There are other mines that would normally be included as major mines, but their inclusion in the Alaska Bond Pool program brings their individual bond amounts below the \$250,000 cut-off.
- Existing operations disturb a total of 3,603 acres in the state, for a total reclamation and closure bond amount of \$9,462,910. The state's average bond amount of \$2,626 per acre ranks in the low mid-range of bonding values in the western states.
- One major mine in the State is currently in bankruptcy (Illinois Creek). Another mine that was part of the Alaska Bond Pool Program is also bankrupt, with clean-up costs likely to exceed \$250,000 (Nixon Fork).

Taxpayer Liability

The weaknesses in the current state program could result in a gap between the estimated costs of reclaiming the existing mines and the available bonds of 150 to 500 percent, leaving taxpayers with a potentially unfunded liability of \$7.2 million to \$57.6 million. Taxpayers will be left with this liability in the event that the mining companies fail to meet their reclamation obligations.

Strengths of the state reclamation bonding program:

- Alaska only allows for participation in the statewide bonding pool, surety bonds, or personal bonds accompanied by a letter of credit, certificate of deposit or by a deposit of cash or gold.
- The Alaska Reclamation Act applies only to the portion of a mining operation active after October 15, 1991. There are no exemptions under this provision as all of Alaska's existing major mines were active in their entirety after October 15, 1991.
- Alaska can conduct mine inspections as necessary to determine compliance with the statutes. Alaska's regulatory history, however, does not indicate that compliance inspections have been routinely conducted with the intent of determining regulatory compliance.

Weaknesses of the state reclamation bonding program:

- A separate administration for different aspects of reclamation and closure (both among state agencies and between the state and federal agencies) presents a difficult regulatory scheme with the potential for shortcomings on water quality issues.
- The State does not require bonding on federal lands if the responsible federal agency has an approved reclamation plan and bonding mechanism consistent with state statutes. This provision limits the State's authority to require bonding on federal lands.
- Despite a large area of tribal lands and lands affected by treaty, the State has no formal relationship with the various tribal organizations with respect to mining and reclamation issues.
- Under provision of the Reclamation Act, the amount of performance bond may not exceed \$750 for each acre of mined area. (An operator may provide a bond for more than the amount required, and most mines voluntarily exceed the \$750 per acre limit. However, not all of them do.) In cases where the company volunteers a higher bond amount, the \$750 per acre limit essentially compels the Division to accept the original cost estimate of the company.
- The Alaska Reclamation Act exempts operations of five acres or less from requirements. This exemption essentially allows small mining operations in the state to be conducted without regard for reclamation and closure issues.

- The Alaska Reclamation Act lacks substance in terms of comprehensive and specific performance standards and other requirements. Reclamation planning in the State fails to adequately address water quality and fails to consider wildlife habitat and aesthetic considerations. The limitations on topsoil, revegetation and public safety seriously compromise the statutes as well.
- Alaska's Department of Environmental Conservation does not require additional financial assurance for mining operations that employ cyanide leaching or other toxic chemicals.
- Alaska is the only state, with the exception of Arizona, that permits reclamation and closure costs to be calculated on the basis of costs to the company, without regard for the indirect costs that would be necessary if the agencies were to perform reclamation.
- Alaska's bond release statutes do not address the liability of the operator and surety provider with respect to bond release
- Alaska's bond pools allow operators that would otherwise be unable to obtain standard bonds for various reasons, including financial difficulties, to obtain necessary bonding.
- No specific provisions for public participation are provided in the Alaska Reclamation Act. (Alaska does allow for proposed bonding to be included in the public review process for new permits.)

Alaska's Mining Case Studies

The *Fort Knox gold mine* began operations in 1995 on state lands in Alaska. Approximately 1500 acres were disturbed through 1998 at this site. The disturbances associated with this project are "insured" with three separate reclamation bonds, including bonding for post-reclamation operation of a freshwater reservoir and access roads. The total reclamation bond is \$4.9 million

The *Red Dog lead, zinc and silver mine* is operating in northwestern Alaska since 1990, on lands owned by one of Alaska's Native corporations. Through 1998, approximately 1,300 acres were disturbed. The mine was bonded at the statutory limit of \$750/acre, with an additional \$5 million to address potential water quality impacts.

Additional information on these mines can be found in the National Wildlife Federation's "*Hardrock Reclamation Bonding Practices*" report.

State of Arizona **Reclamation Bonding Program**

Mining statutes:

Arizona adopted the Arizona Mined Land Reclamation Act in 1994. Rule making followed in 1996, as did the establishment of the Aquifer Protection Permit (APP) program.

Lead agencies:

- The State Mine Inspector's Division of Mined Land Reclamation is responsible for administration of the Mined Land Reclamation Act on private lands.
- The State Land Department is responsible for administration of the Act on state lands.
- The Arizona Department of Environmental Quality is responsible for administration of the Aquifer Protection Permit Program.

Mine and bond information:

- There are currently 15 major copper mining operations permitted in the state, with 12 operating mines, one proposed mine, and two mines closed or suspended.
- Existing bonds cover 78,837 total disturbed acres, with a bond total of \$146,456,779.
- Arizona's average bond amount of \$1,850 per acre ranks among the lowest of all the western states.
- No major Arizona mines are currently in foreclosure or bankruptcy. However, copper prices are at a 20-year low, and Broken Hill Petroleum suspended operations at its Pinto Valley mine. Closure of several mines is imminent in the next five years.

Taxpayer Liability

The current reclamation bonds posted in Arizona underestimates the potential cost of reclamation by 50 to 200 percent. In the event of default by the companies operating in the state, taxpayers could face costs of \$73 million to \$292 million. By allowing corporate guarantees rather than a secure form of bond, the public ends up potentially covering the entire costs of reclamation in the event the mining companies fail to fulfill their reclamation obligations, resulting in a potential liability of \$438 million.

Strengths of the state reclamation bonding program:

Because of the overall weakness of the state's reclamation bonding program, even these strong points are typically overwhelmed and ineffectual. The following program strengths are therefore contingent on a major overhaul of current statutes and regulations.

- Arizona can conduct mine inspections as necessary to determine compliance.
- A bond adjustment to account for inflation, changed costs and/or new disturbances is required at least every five years.
- Arizona's statutes allow for forfeiture in the event of abandonment, foreclosure or similar circumstances.

Weaknesses of the state reclamation bonding program:

- Lack of coordination between multiple agencies compromises overall reclamation and bonding process. This includes a lack of coordination between various state agencies, between state and federal agencies and between state agencies and tribal organizations. Arizona is the only western state without any Memorandums of Understanding (MOU's) with federal agencies.
- Specific bonding authority is not clearly stated in the statutes, especially for federal land. Separate permitting processes and other duplicated roles are an inefficient use of limited resources.
- Special consideration is allowed to any surface disturbance created, in whole or in part, before July 17, 1994. Incidentally, all of Arizona's major active copper mines existed, in whole or part, prior to 1994. In essence, nearly all of Arizona's existing major hardrock mines are, by this provision, exempted from the reclamation and closure statutes of the State.
- Any disturbance of less than five acres is also exempt from the reclamation and bonding process. There is no provision to get around this exemption, regardless of mining activity or environmental impact.
- Skippy reclamation plan requirements fail to include provisions for topsoil, water quality, geochemical acid mine drainage (AMD), wildlife habitat and aesthetics.
- The Arizona Aquifer Protection Permit program relies on the Arizona mining guidance manual, *Best Available Design Control Technologies* (BADCT), to define its reclamation and closure practices. Unfortunately, BADCT focuses primarily on facilities design; its consideration of reclamation and closure is very limited in scope. In addition, use of the

manual as a sole source of Aquifer Protection Permit standards assumes that BADCT is both infallible and timeless—that there are no better technologies and never will be.

- Current statutes allow for the approval of reclamation plans prior to approval of the bonding mechanism.
- Bonding amounts are determined by the mining company. These amounts are allowed to be estimated based on what reclamation would cost for the company to perform the necessary tasks. Unfortunately, if the bond is needed to complete reclamation, it won't be the company who's performing the tasks. This element of bond estimation is the primary reason that Arizona's average bond amount is among the lowest of the western states.
- Nearly every type of bonding is allowed in the state, including financial tests (which ridiculously require only that a mine get up and running to prove its financial viability) and the dreaded corporate guarantee (or self-bonding) mechanism.
- Bond release statutes in the state return financial assurances too quickly and with little regard for proper reclamation. (No inspections are required and no vegetative growth standards have been developed.)
- Public participation in the reclamation and bonding process is extremely limited.

Arizona's Mining Case Studies

The *Pinto Valley copper mine* began operation west of Miami, Arizona in 1972, primarily on privately owned and patented lands (patented lands are lands acquired from the federal government under the Mining Law of 1872). Today the operation includes U.S. Forest Service land exchange areas. A reclamation plan is currently approved for facilities associated with the mine that were active after January 1, 1986, and which are not on federal lands. This mine is currently in an inactive status, according to company reports.

The photos of the tailings spill at *Broken Hill Petroleum's Pinto Valley Mine* illustrate the kind of environmental damage that taxpayers would pay for, if the company failed to meet its reclamation obligations.

The *Cyprus Sierrita copper mine* is active near Green Valley, Arizona. The site is expected to disturb over 4,300 acres at closure (projected at 2019), with a single large open pit covering 1,500 acres.

Additional information on these two mine sites can be found in the National Wildlife Federation's "*Hardrock Reclamation Bonding Practices*" report.

State of California **Reclamation Bonding Program**

Mining statutes:

California's Surface Mining and Reclamation Act (SMARA) was enacted in 1975, and was significantly amended in 1980. Other guidelines include the State Mining and Geology Board Reclamation Regulations (Title 14, Division 2, Chapter 8, Subchapter 1, California Code of Regulations) and the Surface Mining and Reclamation Act Financial Assurance Guidelines (State Mining and Geology Board, 1997).

Lead agencies:

Presently, most of the major mines in California are subject to county authority. The "Lead agency" in California can be the city, county, a conservation district or commission, or the state board. The California Department of Conservation assumes primary responsibility for permitting and bonding only if a local government is not present or does not wish to take the responsibility. Otherwise, the Dept. of Conservation primarily serves in an advisory role, ensuring that the county complies with the State's reclamation and closure requirements.

Mine and bond information:

- 13 major gold and silver mining operations are currently permitted in the State, with nine operating mines, three mines presently being reclaimed and the status of one mine unknown.
- Existing bonding covers 8,926 total disturbed acres in the state, with a total reclamation and closure bond amount of \$34,031,851. The state's average bond amount of \$3,812 per acre ranks in the lower mid-range of the western states.
- No major mines in the state are currently in foreclosure or bankruptcy.

Taxpayer Liability

The current reclamation bonding in the state underestimates the total potential cost to taxpayers of cleaning up after the mining companies by 50 to 200 percent, leaving taxpayers potentially liable for funding \$17 million to \$68 million worth of reclamation, in the event that mining companies fail to meet their reclamation obligations.

Strengths of the state reclamation bonding program:

- Since none of the existing, major mines began production before the establishment of SMARA, all the lands affected by major hardrock mines in California are entirely subject to the reclamation and closure planning and bonding provisions of the Act.

- SMARA's provisions for topsoil, recontouring, revegetation, water quality and wildlife habitat are recommended as examples of modern regulation.
- California requires additional financial assurance for mining operations that employ cyanide leaching or other toxic chemicals.
- California bases the cost of reclamation and closure over the expected project life, with bonding based on reclamation and closure at the end of project life. Phased bonding is allowed.
- Self-bonding is not allowed by SMARA.
- California's statutes allow for forfeiture in the event of abandonment or in the event the operator is financially incapable of performing reclamation in accordance with the approved reclamation plan. (However, a time period in which this forfeiture will take place must be established.)
- SMARA requires that the financial assurance provisions remain in effect for the duration of the surface mining operation and any additional period until reclamation is completed.

Weaknesses of the state reclamation bonding program:

- The concept of separate state and county authority has served to create a confusing and inefficient bonding scheme in California. The primary result of this deficiency appears to be a lack of trained technical staff at the county level.
- California has no formal relationship with the various tribal organizations with respect to mining as it affects tribal lands.
- California's existing exemption for operations of under one acre and less than 1,000 cubic yards essentially allows "hobby" mining operations in the state to be conducted without regard for reclamation and closure issues.
- Geochemical - acid mine drainage (AMD) considerations are not specifically required in SMARA. This has resulted in a general lack of geochemical-AMD prediction at California mines.
- SMARA allows the amount of the bond to be determined by the company. In practice, California's counties and the Department of Conservation accept the original reclamation and closure cost estimate by the company in most cases, lacking the expertise to question the company's submittal.

- SMARA fails to require adequate review and adjustment of the bond amount so as to reflect any changes in circumstance or interpretation of the statutes.
- The practice of allowing for pledges of revenue or budget set-asides allows the operator to finance reclamation and closure costs from the hoped-for revenue stream from the mine.
- California's SMARA does not contain specific provisions for public participation in bonding.

California Mining Case Studies

In 1996, the *Briggs Project* gold and silver mine began operation near Death Valley National Monument, Inyo County, California. It is projected to disturb 350 acres over the life of the mine. Reclamation bonds are required under three separate regulatory entities to ensure clean-up of the site.

The *McLaughlin gold and silver mine* has been operating in northern California since 1984. The total project area is projected to include 1,500 acres at the completion of mining; 1,082 acres are targeted for reclamation under the current reclamation plan.

Additional information on these two mine sites can be found in the National Wildlife Federation's "*Hardrock Reclamation Bonding Practices*" report.

State of Colorado

Reclamation Bonding Program

Mining statutes:

Colorado's Mined Land Reclamation Act was enacted in 1973, and has since been amended numerous times. Hardrock / Metal Mining Rules and Regulations followed in 1977, and have also been amended.

Lead agencies:

- The Colorado Mined Land Reclamation Board is responsible for the promulgation of rules under the Colorado Mined Land Reclamation Act.
- The Division of Minerals and Geology, Department of Natural Resources, is the lead state agency responsible for administering the Colorado Mined Land Reclamation Act.
- The Colorado Department of Public Health and Environment, Water Quality Control Division is responsible for the regulation of any discharges from the mine and other water quality considerations.

Mine and bond information:

- Eight major metallic hardrock mining operations are currently permitted in the state. There are two gold and silver mines (one operating and one closed), one primary gold mine (suspended) and one primary silver mine (closed), two molybdenum mines (one operating and one suspended) and two precious and base metals mines (both suspended). The Summitville mine Superfund cleanup is not included in this list.
- Existing bonding covers 10,986 total disturbed acres in the state, with a total reclamation and closure bond amount of \$97,846,815. The state's average bond amount of \$8,907 per acre ranks in the upper mid-range of the western states.
- With the exception of Summitville, no major mines in the State are currently in foreclosure or bankruptcy.

Taxpayer Liability

Overall, Colorado has taken steps to ensure that the companies mining in the state post a guarantee adequate to cover the costs of reclamation. However, even with recent changes in regulations governing reclamation bonding, Colorado underestimates the cost of reclamation by 20-50 percent, leaving a potential unfunded liability of \$20 - \$50 million. In addition, taxpayers may have to cover the costs of reclamation if the State continues to allow for "collateral" to take the place of hard currency as a financial guarantee, or if the state inadequately estimates the cost of reclamation due to acid mine drainage or similar considerations.

Strengths of the state reclamation bonding program:

- Bonding is required under the Colorado Mined Land Reclamation Act (MLRA) on all lands—private, state and federal.
- The Colorado Mined Land Reclamation Act applies to lands affected by operations conducted after June 30, 1976. While many of the mines in the state existed prior to 1976, Colorado can apply the modern statutes and bond for the entire disturbed area of any operations conducted after 1976.
- Since July 1, 1993, all applications for permits to conduct mining operations, regardless of size, are required to include a financial warranty in the amount determined pursuant to the Act.
- The Mined Land Reclamation Acts's provisions for topsoil and water quality are recommended as examples of modern regulation.
- The Colorado Mined Land Reclamation Act requires that financial assurance be provided before a permit is issued.
- While the company is allowed to calculate the bond (an undesirable practice), Colorado requires that the estimate be based on the cost of reclamation as if the responsible agency were to perform the tasks.
- Colorado's Act allows the bond amount to be reviewed at any time, at the division's discretion. (However, a specific time period for bond review is not mandated).
- Inspections are required to approve the reclamation and closure activities, and substantive vegetative growth standards have been developed to measure revegetation efficacy.
- Colorado's Act establishes an emergency response cash fund. The Division can use this fund to conduct emergency responses or perform emergency reclamation activities. (The fund, however does not address potentially unbonded liabilities, particularly those associated with water-degrading impacts.)

Weaknesses of the state reclamation bonding program:

- The Colorado Mined Land Reclamation Board is a typical example where pro-industry bias in the make-up of the governing body is evident. There is no representative from the environmental community or anyone with specific environmental expertise included on the Board.

- The separate administration of the Reclamation Act and Water Quality Control program in Colorado's regulatory scheme has resulted in an apparent gap with respect to water quality issues. The result of this gap is a lack of ability to provide for environmental protection.
- The CMLRA lacks comprehensive and specific provisions for recontouring, revegetation, stability, hydrology, geochemical acid mine drainage prediction, or management, and wildlife habitat.
- Colorado does not require additional financial assurance for mining operations that employ cyanide leaching or other toxic chemicals, except for detoxification of heap leach pads.
- Colorado's statutes allow for incremental bonding.
- Colorado allows for nearly every possible form of financial assurance, including a corporate financial test, corporate guarantees (self-bonding) and equipment salvage value.
- Only general closure regulations are contained in the Act. General regulations are often insufficient to ensure proper closure and acceptable water quality.
- Colorado's Act allows for the partial release of bonding as requirements are performed. No provisions are included that allow the state to modify or extend the surety agreement to fulfill closure/post-closure requirements.
- Colorado's Mined Land Reclamation Act contains limited provisions for public participation in bond permitting, review and release.

Colorado's Mining Case Studies

The *Cresson* gold mine, operated by Cripple Creek and Victor Mining Co., began production in 1995 in central Colorado. This project includes several mining sites within the historic Cripple Creek Mining District.

More information on this mining operation can be found in the National Wildlife Federation's "*Hardrock Reclamation Bonding Practices*" report.

Colorado's recent mining history also includes one of the largest, and most expensive, mines that are being cleaned up at public expense. This mine site, *Summitville gold mine*, is identified in the photos.

State of Idaho

Reclamation Bonding Program

Mining statutes:

Idaho's Surface Mining Act was established in 1971. In 1989, rules were promulgated under authority of the Act. In 1996, the Act was significantly revised. Major revisions to the rules followed in 1998.

Other statutory features affecting hard rock mining include the Idaho Dam Safety Act and the Tailings Impoundment Structures Rules, which establish specific tailings impoundment bonding provisions. The Rules for Ore Processing by Cyanidation establish detoxification/ closure bonding provisions for cyanide operations.

Lead agencies:

- The Idaho Department of Lands administers the Surface Mining Act.
- The Department of Water Resources administer the Idaho Dam Safety Act.
- The Idaho Department of Health and Welfare administers the Rules for Ore Processing by Cyanidation.
- Idaho typically enters into project specific Memorandum of Understanding with the Bureau of Land Management and U.S. Forest Service.

Mine and bond information:

- Seven major hardrock surface mining operations are currently permitted in Idaho. There are six gold and silver mines (one operating, three suspended, two closed and undergoing reclamation) and one primary molybdenum mine currently in operation.
- Existing operations disturb a total of 5,790 acres, with a total reclamation and closure bond amount of \$39,926,236. The state's average bond amount of \$6,895 per acre ranks among the mid-range of the western states.
- The parent company of one major mining operation (Dakota Mining Corp, Stibnite Mine) is currently in bankruptcy proceeding, and the State of Idaho and the Forest Service are currently responsible for reclamation and closure of Black Pine mine as a result of the bankruptcy of Pegasus Gold Co.

Taxpayer Liability

The current reclamation bonds posted in Idaho underestimate the potential cost of reclamation by 50 to 400 percent. In the event of default by the companies operating in the state, taxpayers would have to cover costs of \$20 million to \$160 million. By failing to take into account the indirect costs of the agency performing reclamation, the public ends up covering the costs of reclamation in the event the mining companies fail to fulfill their reclamation obligations.

Strengths of the state reclamation bonding program:

- The Idaho Surface Mining Act applies to all lands—private, state and federal.
- Idaho's statutes do not contain exemptions for small mining operations. (Although the exemption of underground mines also exempts small mines, if they are underground.)
- Idaho's Surface Mining Act contains specific provisions addressing topsoil and revegetation.
- The Idaho Surface Mining Act requires that financial assurance be provided before operations begin.
- Idaho allows for surety bonds, collateral bonds, or letters of credit as form of acceptable surety.
- Idaho can conduct mine inspections as necessary to determine compliance with the statutes.

Weaknesses of the state reclamation bonding program:

- The administration of the various Acts by separate agencies presents a difficult regulatory scheme—one with the potential for a number of shortcomings.
- Despite significant areas of tribal lands in the State, Idaho has no formal relationship with the various tribal organizations with respect to mining issues that affect those lands.
- Idaho's regulatory scheme is the only one in the western U.S. that exempts underground mines from normal reclamation and closure provisions. The exemption leaves a serious gap in Idaho mine regulation. Idaho has several large underground operations with the potential to impact hydrology and water quality.
- Idaho's reclamation scheme fails to adequately address hydrology, water quality and geochemical acid mine drainage issues. It also fails to consider public safety, wildlife habitat, and aesthetic considerations. These limitations essentially preclude the ability of the State to require responsible mining practices.
- Although Idaho, under Rules for Ore Processing by Cyanidation, does allow the Board of Health and Welfare to require additional bonding for the employment of toxic chemicals, the agency is limited to a bond of \$100,000. The limitation essentially makes the rules ineffective to ensure closure, as costs reach significantly beyond \$100,000.
- Closure requirements are not included in the Surface Mining Act.

- Idaho allows incremental release of bonding as specific aspects of reclamation are performed. Statutes do not address the liability of the operator or surety provider and there are no provisions that allow the state to modify the surety agreement to fulfill requirements.
- Idaho's statutes do not include emergency response or reclamation funds.
- No specific provisions for public participation are provided in the Idaho Surface Mining Act.

Idaho's Mining Case Studies

The *Beartrack gold mine* began operation in 1995 near Salmon Idaho on lands administered by the U.S. Forest Service. Low gold prices resulted in revisions in the mine plan, which is now in the final stages of operation. Detoxification of the site is taking place, and the mine operator will leave one or two open pits remaining on the site.

The *Thompson Creek molybdenum mine* began operation in 1982 near Challis Idaho. In 1994 acid mine drainage began to form in conjunction with the open pit operation, located primarily on private lands with some facilities on federal lands.

The photo of the *Thompson Creek* mine illustrates the kind of large-scale environmental damage that can occur from modern mining – in this case, the creation of acid mine drainage in the tailings impoundment. Costs for controlling acid mine drainage need to be factored in to all reclamation bond calculations.

Additional information on these two mine sites can be found in the National Wildlife Federation's "*Hardrock Reclamation Bonding Practices*" report.

State of Montana

Reclamation Bonding Program

Mining statutes:

Montana's Metal Mine Reclamation Act (MMMA) was established in 1971. In 1995, the adoption of rules served as a significant supplement to the Act. Both the rules and the MMRA have been modified several times. The Montana Hard Rock and Placer Mining Requirements (Montana Department of Environmental Quality (MDEQ), Permitting and Compliance Division – Hard Rock Program) were last revised in January 1997.

Lead agencies:

- All of Montana's reclamation and closure responsibility lies within various sections of the Department of Environmental Quality (DEQ).
- The DEQ has a statewide Memorandum of Understanding with the Forest Service and Bureau of Land Management that gives it primary authority over bonding, monitoring and enforcing reclamation and closure provisions.

Mine and bond information:

- Twelve major hardrock metals mining operations are currently permitted in the state. There are seven gold and silver mines (one operating, two suspended and four closed and undergoing reclamation). In addition, there is one copper and silver mine (suspended), one primarily copper mine (operating), one gold, lead and zinc mine (operating) and two platinum/ palladium mines (one operating, one in development).
- Existing operations disturb a total of 14,006 acres, with a total reclamation and closure bond amount of \$209,362,000. The state's average bond amount of \$14,948 per acre ranks as the highest of the western states.
- Five major mines in the state were affected by the bankruptcy of Pegasus Gold Co. Three of the mines are closed and being reclaimed by the state with the existing bonds, which are likely to be inadequate to cover the actual cost of reclamation and closure. The two remaining mines were included among the assets of the reformed company named Apollo Gold Co.

Taxpayer Liability

The current reclamation bonds in the state of Montana may underestimate the actual costs of reclamation by 10 to 25 percent, leaving a gap of \$20 million to \$50 million. If the mining companies fail to reclaim these sites, the public could be left to cover these costs of cleaning up

the mine sites. The unfunded taxpayer liability may also increase substantially as the true costs of reclaiming the Zortman-Landusky mine become known.

Strengths of the state reclamation bonding program:

- Montana's Department of Environmental Quality combines mine reclamation and environmental protection into a common department.
- Bonding is required under the Montana MMRA on private, state and federal lands.
- Although the Montana MMRA does not apply to lands affected by operations conducted prior to 1971, all of the existing mines in the state were proposed and operated after 1971. With a single exception, all of the hardrock mines in the state are entirely subject to the provisions of the MMRA. (The exception is that parts of the Continental operations, because they are considered the Anaconda Copper Mining Co. Berkeley Pit, are subject to historic maximum bonding levels of \$250 per acre or \$750 per acre, depending on the area.)
- The Montana Metal Mine Reclamation Act requires that bonding be provided before a permit is issued.
- Although Montana allows the company to take the lead in cost estimation, the state typically employs a highly qualified staff to carefully examine the company's estimate. Typically, substantive changes are made before MDEQ approves the estimate. Average bond amounts in the state—the highest of all western states—reflect the attention paid to estimates.
- The MMRA requires that the bond be reviewed at least every three years to determine whether it is still represents the costs of compliance with the act.
- Montana's statutes allow for forfeiture if reclamation is not pursued in accordance with the reclamation plan within 30 days of notification. Forfeiture also occurs if reclamation is not completed within two years of abandonment or completion or within three years of temporary closure. Finally, forfeiture occurs if the surety either refuses or fails to perform the work.
- The MMRA establishes a reclamation account available for use by the Department to conduct research, reclamation, revegetation of land and rehabilitation of water affected by mining operations.
- Montana has a unique provision allowing for citizen complaints.

Weaknesses of the state reclamation bonding program:

- Despite a large area of tribal lands in the state, and a history of significant issues with tribal entities and mining operations, the state has no formal relationship with the various tribal organizations with respect to issues affecting those lands.

- Montana's existing exemption for operations of less than five acres allows small mining operations to be conducted without adequate regard for reclamation issues.
- The MMRA lacks substance in terms of comprehensive and specific performance standards. The Act fails to address key issues and leaves others open to wide interpretation. (The state has developed additional guidelines and policies, but they are not included as specific and enforceable regulations.)
- Montana does not require additional bonding for mining operations that employ cyanide leaching or other toxic chemicals. (Bonding is required for detoxification of heap leach pads.)
- Closure requirements are not specifically addressed in the MMRA. (MDEQ, however, has developed closure policies with respect to the state's water quality statutes for heap leach detoxification.)
- MMRA allows for the incremental release of bonding as activities are performed. This does not address the liability of the operator or surety provider. Also, no provisions allow the state to modify or extend the surety agreement to fulfill closure/post-closure requirements.

Montana Mining Case Studies

The *Golden Sunlight gold mine* operates on private and federal lands near Whitehall, Montana. This operation has undergone numerous revisions in the mine plan, including a recently approved mine expansion in 1998. Projected to disturb over 2000 acres, this site is also producing acid mine drainage.

The *Zortman - Landusky gold mine* was operated by Pegasus Gold in the Little Rocky Mountains of north-central Montana. This mine began operation in the late 1970's, and has undergone various expansions. In 1998, the mining company declared bankruptcy. This site is now in reclamation.

The photo of the *Zortman – Landusky* mining operation represents one of the latest in a series of “modern” gold mines that are being left unreclaimed by the mining companies. Taxpayers will have to cover the costs of restoring the lands and waters affected by these mining operations.

Additional information about these case studies can be found in the National Wildlife Federation's “*Hardrock Reclamation Bonding Practices*” report.

State of Nevada **Reclamation Bonding Program**

Mining statutes:

Nevada's Mined Land Reclamation Act was enacted in 1989, and was followed by the promulgation of rules in 1990.

Lead agencies:

- The Nevada Division of Environmental Protection (NDEP), Department of Conservation and Natural Resources administers reclamation and closure regulations.

This regulatory agency combines reclamation and environmental protection of water quality into a common department.

A Memorandum of Understanding between state and federal agencies establish the following relationship:

- For operations of National Forest System lands, the U.S. Forest Service will be the lead agency.
- For operations on Bureau of Land Management lands (BLM), the BLM will be the lead agency.
- For operations on state trust lands, fee lands, other state-owned or privately owned lands and Federal reserved minerals within Stockraising Homestead Act or Taylor Grazing Act lands, the NDEP will be the lead agency.
- For operations conducted on both public and private lands, the Federal agency will be the lead agency.
- Where the agency with surface management jurisdiction agrees, the NDEP may act as the lead agency, regardless of aforementioned provisions.

Mine and bond information:

- 73 major hardrock metals mining operations are currently permitted in the state. There are 70 gold and silver mines (52 operating and 17 either suspended or closed) and three copper mining operations (one operating and two closed).
- 65 of the 73 major hardrock mining operations currently permitted in Nevada are located, at least partially, on public land administered by the Nevada Bureau of Land Management.
- Existing bonding covers 86,631 total disturbed acres in the state, with a total reclamation and closure bond amount of \$438,122,196. The state's average bond amount of \$5,057 per acre ranks around the mid-range for the western states.
- 13 major mines are currently in foreclosure or bankruptcy in the state.

Taxpayer Liability

With as much as 50% of existing bond “guarantees” based on company guarantees or self-bonding (in the event of company forfeiture), Nevada faces a huge potential bonding gap of over \$360 million, in addition to the underestimation of actual reclamation costs identified below.

The State of Nevada underestimates the cost of reclaiming mines in the state by 20 to 100 percent, leaving taxpayers to potentially cover additional costs as high as \$96 million to \$480 million.

Strengths of the state reclamation bonding program:

- The same Department administers both reclamation programs and the water quality program.
- Bonding is required under the Nevada Mined Land Reclamation Act on all lands—state, federal and private. (Bonding on private lands, however, is limited.)
- Nearly all of the hardrock mines in the State are subject in their entirety to the planning and bonding provisions of the Nevada MLRA.
- The Nevada Mined Land Reclamation Act requires that financial assurance be provided before a permit is issued.
- Nevada’s statutes allow for forfeiture of the bond if reclamation is not initiated within two years of abandonment or completion, or within three years of temporary closure.

Weaknesses of the state reclamation bonding program:

- Despite a large area of tribal lands in the state, Nevada has no formal relationship with the various tribal organizations with respect to mining and reclamation issues.
- Nevada allows for most forms of financial assurance, including corporate guarantees (self-bonding). As a result of this wide discretion, up to 75 percent of Nevada’s financial assurance is represented by non-liquid and essentially unenforceable guarantees.
- Nevada statutes allow for the exemption of operations of five acres or less that do not remove more than 36,500 tons per year of material from bonding requirements.
- Reclamation planning in Nevada fails to adequately address recontouring, hydrology, water quality and geochemical - acid mine drainage considerations, and fails to consider public safety, wildlife habitat, and aesthetic considerations.

- The limitation on reclamation provided in the State, which states that “Reclamation activities must be economically and technologically practicable in achieving a safe and stable conditions suitable for the use of the land,” essentially prohibits the State from requiring any measures which the company determines “economically” impractical.
- Nevada does not have the authority to bond for closure requirements on private land. As a result of this lack of authority, many operations locate heap leach and tailings ponds on private land to avoid the requirements and cost of closure regulations required on state and federal land.
- No specific provisions for public participation are provided in the Nevada MLRA.

Nevada Mining Case Studies

The *Florida Canyon gold mine* is an active operation near Winnemucca, Nevada. This operation, owned by Apollo Gold, formed by assets from Pegasus Gold Co, started operation in 1986. The mine is projected to cover over 1,600 acres of private and Bureau of Land Management lands. In 1996 the state established a reclamation bond for the site. In 1998, that reclamation bond was supplemented with funds for a contingency fund in the event the mine shuts down.

The *Trenton Canyon Gold Project* is located on private and Bureau of Land Management lands near Battle Mountain Nevada. It is expected to impact and reclaim roughly 2,400 acres over the life of the project, which includes a recently approved expansion

The *Twin Creeks gold mine* is located on private and Bureau of Land Management lands northeast of Winnemucca Nevada. It is actually the combination of the Chimney Creek mine, started in 1988, and the Rabbit Creek mine, which started in 1990, and now have merged. The mining company, Newmont Mining Co., currently holds a reclamation bond for restoration of approximately 9,400 acres.

Additional information about these mine sites is available in the National Wildlife Federation’s “*Hardrock Reclamation Bonding Practices*” report.

The photo of the *Gold Quarry Mine* in Nevada illustrates the extent to which modern mines impact surface and ground water resources. This project’s impacts on water resources are not adequately reflected in the reclamation bond calculated for this project.

State of New Mexico **Reclamation Bonding Program**

Mining statutes:

New Mexico's Mining Act (NMMA) was originally established in 1978. The Act was significantly and extensively amended in 1993. Rules for the NMMA followed in 1994. The New Mexico Water Quality Act is administered separately from the Mining Act.

Lead agencies:

- The Mining and Minerals Division, of the Energy, Minerals and Natural Resources Department, is the lead state agency responsible for administering the New Mexico Mining Act.
- The New Mexico Environment Department is responsible for the regulation of any discharges from the mine and other water quality considerations.
- New Mexico typically enters into Memorandum of Understanding with the Bureau of Land Management and U.S. Forest Service for mining activities affecting federal lands.

Mine and bond information:

- Eight mining operations in New Mexico qualify as major mines. There are five mines that primarily produce copper (two operating and three suspended), one gold and silver mine (operation suspended), one primary molybdenum mine (operating) and one lead, zinc and copper milling operation (being reclaimed).
- Reclamation and closure planning and bonding has been an on-going process since New Mexico's Mining Act was established in 1993. While all plans and bonds were to have been established by the end of 1999, recent information indicates that final approval may require additional time. The State is in the process of establishing interim bonds until the final planning and bonding process is completed.
- The current disturbed acreage in the State is unknown, but is estimated at 10,000 acres. Preliminary information indicates that the total bond amount that will be established for New Mexico's major metallic hardrock mines should exceed \$200,000,000 (or greater than \$20,000 per acre). This amount is due to the substantive requirements contained in New Mexico's Mining Act and the realization of acid mine drainage-related issues at several major sites.
- The owner of one major mine is currently in bankruptcy (Alta Gold, owner of the Copper Flat mine).

Taxpayer Liability

It is too soon to determine what gap, if any, will exist between the reclamation bonds posted by industry in the State and the real costs of reclamation, since the state has not completed updating its bonds under the 1993 Act. In theory, New Mexico's statutes allow the agencies to determine bond amounts that cover the full cost of reclamation and closure, and will not result in unfunded public liability.

Strengths of the state reclamation bonding program:

- Bonding is required under the New Mexico Mining Act on all lands—private, state and federal.
- The New Mexico Mining Act contains comprehensive and specific performance standards and other requirements. The Act specifically addresses wildlife protection, hydrologic balance, stream diversions, surface stability, erosion control and revegetation. Its provisions for revegetation and hydrology are recommended as examples of modern regulation.
- New Mexico requires that new operations be designed to eliminate the need for treatment of water resources in perpetuity to meet water quality standards, and result in a self-sustainable ecosystem.
- The New Mexico Mining Act requires that financial assurance be provided prior to permit issuance. (However, as a practical matter, the current lack of bonding pending reclamation and closure plan approval exposes the State and public to significant liability.)
- The New Mexico Mining Act requires that the Mining and Minerals Division determine the bond, and that the amount not be limited to the estimated costs submitted by the company.
- New Mexico allows for most forms of financial assurance, but explicitly disallows any form of self-guarantee or self-insurance as financial assurance. (However, New Mexico does accept “third party guarantees,” which essentially infer parent company corporate guarantees (such as Phelps Dodge Corp. guaranteeing Chino Mines).
- The New Mexico Mining Act requires the Mining and Minerals Division to conduct at least one mine inspection per year. (As long as agencies exercise this authority and make routine on-site inspections of mining operations, this is a bonding scheme strength.)
- The New Mexico Mining Act requires that the bonding provisions remain in effect until released by the Division. For revegetation, the amount of financial assurance is withheld for a period of 12 years following revegetation (not including interseeding to establish vegetative diversity).

- New Mexico is the only state with substantial and explicit provisions for public participation in bonding, including when bonds are established, renewed, and released.

Weaknesses of the state reclamation bonding program:

- The New Mexico Mining Act needs to more specifically and substantively address recontouring, stability, water quality, geochemical acid mine drainage issues, public safety and wildlife habitat, and consideration should be given to provisions for aesthetics.
- Despite a large area of tribal lands in the state, New Mexico has no formal relationship with the various tribal organizations with respect to mining and reclamation issues affecting tribal lands.
- New Mexico exempts operations under two acres and less than 200 cubic yards. This exemption essentially allows “hobby” mining operations to be conducted without regard for reclamation and closure issues.
- New Mexico does not require additional bonding for mining operations that employ cyanide leaching or other toxic chemicals.
- New Mexico is lacking specific and substantive closure and post-closure criteria and standards, as in the recommended regulatory model.

New Mexico Mining Case Studies

Implementation of New Mexico’s mining statute has not matured to the point to assess how reclamation bonding decisions will be addressed under the state program. No case studies for New Mexico were included in the National Wildlife Federation’s “*Hardrock Reclamation Bonding Practices*” report.

The photo of the *MolyCorp molybdenum mine* in New Mexico discusses the hidden environmental impacts associated with modern mining operations – in this case, groundwater contamination – which need to be reflected in the reclamation bond calculations prepared for a mine.

State of Oregon

Reclamation Bonding Program

Mining statutes:

Oregon's Mined Land Reclamation Act was originally established in 1971. It has been significantly and extensively amended since that time. In 1982, the Oregon Mined Land Reclamation Act Applicable To Coal And Metal-Bearing Ores Operations Obtaining Permits After August 16, 1981 was enacted. Rules for Chemical Process Mining followed in 1991.

Lead agencies:

- The Department of Geology and Mineral Industries is the lead state agency responsible for administering the Oregon MLRA.
- The Department of Environmental Quality is responsible for the regulation of solid waste disposal and wastewater discharges.
- Oregon may enter into Memorandum of Understanding with the Bureau of Land Management and US Forest Service for operations affecting federal lands.

Mine and bond information:

- There are presently no major hardrock metals mining operations in Oregon.

Taxpayer Liability

Today, there are no permitted major mining operations in the State of Oregon. There is no outstanding taxpayer liability associated with large-scale mining in the state.

Strengths of the state reclamation bonding program:

- Although reclamation and water quality issues are administered by separate agencies, the Department of Environmental Quality has authority to bond for water quality issues, which will go a long way towards ensuring protection of water quality.
- Bonding is required under the Oregon MLRA on all lands—private, state and federal.
- The Oregon MLRA applies to surface mining operations conducted as of July 1, 1972. In effect, the Act's provisions will affect any new mines in the state.
- The Oregon MLRA requires that financial assurance be provided prior to surface disturbance.

- Oregon requires additional bonding for operations that employ toxic chemicals.
- The Oregon MLRA requires that the Department determine the amount of the bond by estimating the cost of reclamation as if the department were to perform the reclamation.
- It appears that Oregon would base the cost of reclamation and closure over the expected project life, with the bond based on reclamation and closure at the end of project life. There are no specific provisions for phased bonding.
- Oregon's MLRA allows for forfeiture of the bond if the operator fails to comply with a department notice or to complete approved reclamation within three years of the operation's termination. Forfeiture also occurs if the operator fails to complete the approved reclamation and the Department determines that the site has been abandoned.

Weaknesses of the state reclamation bonding program:

- The separate administration of the Oregon MLRA and water quality and solid waste statutes in Oregon's regulatory scheme has the potential to result in inadequacies with respect to water quality issues. (However, unlike other states with separate administrations, the Department of Environmental Quality has authority to bond for water quality issues.)
- The Oregon MLRA exempts operations that disturb less than one acre and produce less than 5,000 cubic yards per year. (However, a permit may still be required by the DEQ.)
- Provisions on topsoil, revegetation, stability, hydrology, water quality, geochemical-AMD and public safety in the MLRA are too general. There are only limited provisions on aesthetics and no provisions for wildlife habitat. This lack of specific standards leaves the potential for inadequate planning and bonding relative to key issues.
- No specific closure regulations are included in the Oregon MLRA.
- Oregon's bond release statutes do not address the liability of the operator or surety provider. No provisions allow the state to modify the agreement to fulfill requirements. No specific standards have been developed to measure revegetation. .

Oregon Mining Case Study

The photos of *Rough and Ready Creek* illustrate an area in the state that may be subject to a massive nickel mining operation, if the effort currently underway by the mining company is successful.

State of South Dakota **Reclamation Bonding Program**

Mining statutes:

South Dakota's Mined Land Reclamation Act was established in 1971. The Act was subsequently revised in 1982, and significant additional laws were passed in 1986. Rules under the Act were promulgated in 1988. There are also currently statutes specific to the Black Hills Region. The Minerals and Mining Program's BONDALC - Reclamation Bond Calculation Program provides specific guidelines for estimating financial assurances.

Lead agencies:

The South Dakota Department of Environment and Natural Resources, Minerals and Mining Program administer reclamation and closure regulations. South Dakota has a Memorandum of Understanding with the U.S. Forest Service for operations on National Forest System lands.

Mine and bond information:

- Six major gold and silver mining operations are currently permitted in the state. There are two operating mines, two mines under temporary cessation or closure, one mine in final reclamation and closure and one proposed mine.
- Existing operations disturb a total of 2,186 acres in the state, with a total bond amount of \$30,949,000. The state's average bond amount of \$14,158 per acre is among the highest of the western states.
- The Gilt Edge mine, operated by Brohm Mining, and owned by Dakota Mining Co., is in bankruptcy.

Taxpayer Liability

The current reclamation bonds posted in South Dakota underestimate the potential cost of reclamation by 20 to 50 percent. In the event of default by the companies operating in the state, taxpayers would have to cover costs of \$6.2 million to \$15.4 million. By failing to adequately take into account the indirect costs of the agency performing reclamation, the public ends up potentially covering the costs of reclamation in the event the mining companies fail to fulfill their reclamation obligations. Inadequacies in estimating acid mine drainage and the resulting water treatment requirements could also result in additional, and significant, public liability.

Strengths of the state reclamation bonding program:

- The South Dakota Department of Environment and Natural Resources combines the administration of mine reclamation with that of environmental protection.
- South Dakota requires bonding on private, state and federal lands.
- The South Dakota MLRA contains comprehensive and specific performance standards for topsoil, revegetation, hydrology, water quality and wildlife habitat.
- The South Dakota MLRA requires that bonding be provided before the issuance of a mining permit.
- South Dakota does require additional bonding for mining operations that employ toxic chemicals. The additional bond amount can range from \$25,000 to \$500,000.
- South Dakota's MLRA specifically incorporates post-closure requirements—the only state to do so.

Weaknesses of the state reclamation bonding program:

- The state has no formal relationship with the various tribal organizations with respect to mining and reclamation issues affecting tribal treaty right areas and tribal lands.
- The South Dakota MLRA applies to lands affected by surface mining operations conducted after July 1, 1971 and to lands affected by underground mining operations after July 1, 1980. The Homestake Mine, which has been operating since the 1800's, is essentially exempt from the Act, so reclamation issues may go unaddressed.
- The South Dakota MLRA allows for a bond limit of \$2,500 per acre on operations if they are ten acres or less and they remove no more than 25,000 tons of ore or overburden per year. No provisions are made for site-specific features in the consideration of whether the limit should apply. This exemption does not allow adequate regard for reclamation and closure issues.
- The South Dakota MLRA, which is partially responsible for a lack of pro-active treatment of water quality issues, lacks any provisions to deal with specific geochemical – acid mine drainage considerations.
- The South Dakota MLRA allows the amount of the bond to be estimated by the company. The estimate is not specifically required to be based on the lead agencies costs or costs for third party contracting. (The state does carefully consider the estimate, but the estimate is based on company costs, not agency costs, as is recommended.)

- The South Dakota MLRA is not specific with respect to surety forms. The Act infers that the operator might assume financial responsibility with sufficient assets.
- While the South Dakota MLRA requires that the amount of the bond be revised periodically to reflect any changes in the cost of the state performing reclamation, in practice, bond amounts lag significantly behind actual costs.
- South Dakota's MLRA does not specifically address the events which might lead to forfeiture of the bond, or a time period in which forfeiture might take place.
- While The MLRA's bond release provisions address the liability of the operator and surety provider, no provisions allow the state to modify the surety agreement to fulfill requirements.
- While South Dakota does have an established reclamation fund, the fund is inadequate to perform significant reclamation or to address issues such as emergency response.
- South Dakota's MLRA does not contain specific provisions for public participation in bonding.

South Dakota Case Studies

The *Gilt Edge* mine began production in the Black Hills of South Dakota in 1988. Originally permitted to disturb 400 acres, this site has expanded to 564 acres of public and private lands. The reclamation and closure bond for this site was initially set at \$1.2 million, and was raised to \$12.9 million when acid mine drainage began to occur at the site.

The photos of the *Gilt Edge* mine illustrate another modern gold mining operation that is bankrupt. If the parent company, Dakota Mining, fails to fulfill its reclamation obligations, taxpayers will be left covering the costs of restoring the lands and waters damaged by this mine.

The *Richmond Hill* mine also began production in 1988 in the Black Hills region in South Dakota. This site also obtained a reclamation bond of \$1.2 million, then encountered significant problems with acid mine drainage in the early 1990's. Current estimates of reclamation and closure are \$10.7 million. The company, LAC Minerals, also will be required to establish a post-closure reclamation bond with the state.

Additional information about these case studies can be found in the National Wildlife Federation's "*Hardrock Reclamation Bonding Practices*" report.

State of Utah

Reclamation Bonding Program

Mining statutes:

Utah's Mined Land Reclamation Act was enacted in 1975. The promulgation of rules followed in 1988 with the Minerals Regulatory Program (Title R647, Utah Administrative Code (UAC)). The Utah Water Quality Act also was enacted to protect water resources in the State.

Lead agencies:

- The Division of Oil, Gas and Mining of the Department of Natural Resources, is the lead state agency responsible for administering the Utah Mined Land Reclamation Act.
- The Utah Department of Environmental Quality is responsible for water quality consideration under its Ground Water Quality Protection Rules.
- Utah has a statewide Memorandum of Understanding with the Bureau of Land Management and US Forest Service for mining projects conducted on federal lands within the state.

Mine and bond information:

- Seven major hardrock mining operations are currently permitted in Utah. There are four gold and silver mines (two operating and two closed and being reclaimed), two operations primarily producing copper (one operating and one permitted but suspended from start-up) and one primarily silver mining operation (closed and being reclaimed).
- Existing bonding covers 29,843 disturbed acres with a total bond amount of \$50,898,471. The State's average bond amount per acre of \$1,706 per acre ranks among the lowest of all the western states. It should be noted however that 23,000 acres of the total are for the Bingham Pit, which is exempt from modern statutes as an "historic site," although it is still an active mining operation. Eliminating this particular mine revises the state's average bond amount to \$7,438, which is in the mid-range of reclamation bonding values in the western states.
- No major mines are currently in foreclosure or bankruptcy in Utah.

Taxpayer Liability

Due to the numerous shortcomings in Utah's mine reclamation bonding program, the gap between what is available in reclamation bonds and the actual cost of reclamation ranges from 20 to 100 percent over existing bond levels, leaving taxpayers to cover \$10.2 million to \$50.0 million in unfunded liability. Although allowed, none of the major mines are self bonded.

Strengths of the state reclamation bonding program:

- The Utah Mined Land Reclamation Act requires that financial assurance be provided before operations are commenced.
- Utah's statutes allow for bond forfeiture if the operator refuses to carry out the necessary reclamation. (However, the statutes fail to provide a time period following closure for reclamation activities to commence and be completed. They also lack the specificity of the forfeiture regulations of most other states.)

Weaknesses of the state reclamation bonding program:

- The separate administration of the Mining Act and water quality issues in Utah's regulatory scheme has resulted in an apparent gap with respect to water quality issues. The Department of Environmental Quality program lacks authority to require bonding relevant to water treatment and other water quality issues.
- Despite a large area of tribal lands in the State, Utah has no formal relationship with the various tribal organizations with respect to mining and reclamation issues affecting those lands.
- Utah's MLRA allows for the exemption of operations of five acres or less. Essentially, this exemption allows small mining operations to be conducted without adequate regard for reclamation and closure issues.
- The Bingham Pit, which covers an area of 23,000 acres in the Bingham Canyon copper operations, is excluded from modern reclamation and closure statutes. Although from the standpoint of surface disturbance and water quality impact the pit is the most significant modern mining feature in the entire country, it remains unbonded.
- The Utah MLRA lacks substance in terms of comprehensive and specific performance standards and other requirements. It also fails to substantively address many key issues relative to the reclamation and closure requirements of most other western states.
- Utah does not require additional bonding for mining operations that employ cyanide leaching or other toxic chemicals, except for detoxification of heap leach pads.
- The Division of Oil, Gas and Mining does not specifically require use of verifiable sources in determining reclamation and closure costs.
- Utah bases the cost of reclamation and closure on the acreage to be disturbed over a five-year period (rather than over the life of the project.) The fact that bonding is allowed on an incremental basis further exacerbates the potential for shortfalls in bond amounts during the life of the project.

- Utah allows most forms of financial assurance, including corporate guarantees (self-bonding). In the event of foreclosure, these guarantees will probably not enable the state to perform reclamation and closure activities without taxpayer funding.
- Monitoring and compliance inspections are not specifically addressed in the Utah MLRA or Minerals Rules. (It has, however, been the practice of the Division to conduct periodic inspections of on-going operations and to monitor sites for a period of three years after the completion of reclamation.)
- A bond review period is not specifically addressed in the Utah MLRA or Minerals Rules. The bond reviews are typically limited to changes in acreage disturbed and inflationary adjustments.
- Closure requirements are not addressed in the Utah MLRA or Minerals Rules.
- Bond release is not addressed in the Utah MLRA or Minerals Rules.
- Utah's statutes do not include emergency response or reclamation funds.
- No specific provisions for public participation are provided in the Utah MLRA.

Utah Case Studies

The *Barneys Canyon* gold mining operation began production in 1990, and is currently owned by Kennecott Minerals. The site was initially projected to disturb 630 acres, with a total bond of \$2.32 million. Adjustments to the mine plan in 1995 increased the disturbed acreage to 1072 acres, all on private lands, with a total new bond amount of \$4.6 million, or roughly \$4,300 per acre unit bond. This reflects a low per acre cost for reclaiming a cyanide heap leach gold mining operation.

The photo illustrates the massive size of *Bingham Pit*. Given the size of this operation, and its exemption from modern mining laws in the state, one can only imagine the extent of unfunded taxpayer liability associated with this site

State of Washington **Reclamation Bonding Program**

Mining statutes:

Washington's Surface Mining Act was enacted in 1970. The Act was subsequently amended in 1993. The Metal Mining and Milling Act was enacted in 1994.

Lead agencies:

- The Department of Natural Resources is the lead state agency responsible for administering the reclamation requirements of the Surface Mining Act.
- The Washington Department of Ecology is responsible for administering the environmental protection requirements of the Metal Mining and Milling Act.
- The state typically enters into a Memorandum of Understanding with the U.S. Forest Service and BLM. Either the state or federal agencies may hold the bond.

Mine and bond information:

- Four major gold and silver mining operations are currently permitted in the state (three operating and one in final reclamation). One additional mine (Crown Jewel) is proposed and in the final stages of permitting.
- It is unknown at this time how many total acres are disturbed in the state, as figures for the Lamefoot/K2 mine are not available. Total bonding for the state, excluding the aforementioned mine is \$3,346,451. The state's average bond amount per acre per acre ranks in the upper mid-range of the western states.
- No major mines in the state are currently in foreclosure or bankruptcy.

Taxpayer Liability

The State of Washington has a potentially unfunded liability at existing major mining operations ranging from 50 percent to 100 percent, or from \$5.0 million to \$10.0 million. The bonding gap is significantly less for new mining operations due to more conservative estimates of bond costs by the state agencies in recent years.

Strengths of the state reclamation bonding program:

- Although the Surface Mining Act and Metal Mining and Milling Act are administered by separate agencies, Washington's regulatory scheme benefits from coordination between the two. Both agencies have bonding authority.

- No provisions for exemptions of small operations are apparent in the MMMA.
- The SMA's provisions for recontouring and revegetation are recommended as examples of modern regulation intended to ensure proper reclamation and closure.
- The Washington SMA and MMMA require that financial assurance be provided before permits are issued.
- Washington requires additional financial assurance for mining operations that employ cyanide leaching or other toxic chemicals.
- The Washington SMA and MMRA give the departments the authority to determine the bond amount.
- Washington requires that the cost estimate be based on information from reliable sources, other than the company itself.
- Washington's SMA and MMRA allow for related administrative costs to be included in the bond amount.
- Washington allows for surety bonds, cash, letters of credit, securities and other forms of readily liquid financial assurance. (Washington also allows for the assignment of interests in real property within the state, which is not readily liquid.)
- The Washington SMA and MMRA allow for the bond to be adjusted at any time to compensate for any alteration in conditions which might affect reclamation costs. The MMRA requires that the bond be reviewed a minimum of every two years. (A specific time period for review is not mandated for the SMA.)
- Under the MMRA, Washington does require bonding for closure, and in practice requires bonding for post-mining water quality treatment and reclamation operation, maintenance and monitoring. (However, more specific closure and post-closure criteria and standards should be established.)
- Washington's acts allow for bond forfeiture in the event the operator has failed to comply with relevant statutes, rules or permits, or has failed to take adequate or timely action to rectify these impacts. (There is no minimum time period in which reclamation activities must occur.)

Weaknesses of the state reclamation bonding program:

- The Washington SMA allows operations of three acres or less to be exempt from reclamation and bonding requirements. This exemption allows small mining operations to be conducted without regard for reclamation and closure issues. (However, the lack of exemptions under

the MMMA at least allows the Department of Ecology to recognize the impact of small mines on site-specific bases.)

- Provisions for topsoil, stability, hydrology, water quality and geochemical-acid mine drainage are not specific enough. Bonding—particularly for geochemical-acid mine drainage considerations—becomes inadequately addressed.
- Washington allows an incremental approach to bonding that is inconsistent with the regulatory model. This approach, though based over the expected project's life, is likely to yield insufficient bonding at some period of the project.
- There are no specific provisions for bonding to fund interim operations provided in the SMA or MMMA. (However, the language in both Acts infers that funding for interim operations could be included in the bond amounts.) There are no bond release provisions that require inspections to approve reclamation activities. Also, no specific performance standards have been developed to measure revegetation efficacy.
- No specific provisions for a reclamation fund are included in the acts.
- Washington's Acts do not contain specific provisions for public participation in bonding.

Washington Case Study

Battle Mountain Gold Co. proposed the *Crown Jewel* gold mining project on National Forest and BLM lands in central Washington. The proposed project would disturb over 780 acres. The total reclamation and closure bonding for this project includes: reclamation bonding, bonds for dam safety and wildlife mitigation, post reclamation water quality treatment, and post-reclamation operations and maintenance. The total bond amount for this site is \$57.2 million.

State of Wyoming **Reclamation Bonding Program**

Mining statutes:

Wyoming's Environmental Quality Act (EQA) was originally enacted in 1970, and was last significantly revised in 1995. In 1992, the Land Quality Division established Non-Coal Rules. Wyoming's hardrock mine reclamation and closure standards are, for the most part, taken from its standards for coal and uranium fuel mines, which give substantive performance guidance, but are very limited in specific bonding requirements.

Lead agencies:

- The Division of Land Quality in the Department of Environmental Quality is the lead state agency responsible for administering the Wyoming EQA.
- The Department of Environmental Quality is also responsible for administering water quality and other environmental protection statutes in Wyoming.
- Wyoming can enter into Memorandum of Understanding addressing hardrock metals mining reclamation and closure with federal agencies. (There are none currently, because there are no hardrock metals mines.)

Mine and bond information:

- There are presently no major hardrock metals mining operations in Wyoming.

Taxpayer Liability

Today, there are no permitted, major hard rock mining operations in the State of Wyoming. There is no outstanding taxpayer liability associated with modern hardrock metals mining in the state.

Strengths of the state reclamation bonding program:

- Bonding is required under the Wyoming EQA on all lands—private, state and federal.
- The Wyoming EQA applies to operations conducted after promulgation of the Act. Any new operations disturbing over 10 acres will be subject to the Act's provisions.
- The Wyoming EQA contains specific provisions addressing topsoil, revegetation and hydrology.
- The Wyoming EQA requires that the operator of a hardrock metal mine provide financial assurance.

- Wyoming allows for forfeiture of the bond for a violation of the EQA. (No time period or means of collecting non-liquid assurances are provided.)
- The Wyoming EQA requires that up to 75 percent of the bond be released upon completion of reclamation. The remaining portion of the bond shall be held for a period of a least five years after the date of reduction to assure proper revegetation and restoration of groundwater.

Weaknesses of the state reclamation bonding program:

- The Wyoming EQA exempts mining operations that disturb less than ten acres of land. Wyoming's provisions do not adequately recognize the potential for small operations to seriously impact the environment, even depending on site-specific considerations.
- The Wyoming act does not contain comprehensive or specific performance standards for water quality or geochemical-acid mine drainage issues. Provisions addressing recontouring, stability, water quality and geochemical-acid mine drainage are too general, as are those on wildlife habitat. There are no provisions on public safety or aesthetics.
- The Wyoming EQA does not specifically require additional bonding for mining operations that employ cyanide leaching or other toxic chemicals.
- Wyoming's statutes allow the company to determine the bond amount based on the cost of the company performing the necessary reclamation activities
- The Wyoming EQA does not specifically address overhead (indirect costs), except for mobilization/demobilization.
- No provisions for bonding to fund interim operations are provided in the Wyoming EQA.
- The Wyoming EQA allows for surety bonds, CD's, treasury bills, cash, letters of credit and self-bonding.
- Monitoring and compliance provisions are not included in the Wyoming EQA.
- No specific provisions for bond review are included in the Wyoming EQA.
- No specific closure regulations are included in the Wyoming EQA.
- No provisions for reclamation funds are provided in the Wyoming EQA.
- No specific provisions for public participation are included in the Wyoming EQA.