



**MINERAL
POLICY
CENTER**

*Protecting
Communities
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Environment*

MPC ISSUE PAPER NO.4

PUTTING A PRICE ON POLLUTION

Financial Assurance for Mine Reclamation and Closure

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Center for Science in Public Participation

March 2003

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ABOUT THE CENTER FOR SCIENCE IN PUBLIC PARTICIPATION AND JIM KUIPERS

The Center for Science in Public Participation (CSP²) is a nonprofit organization that provides scientific and technical services on mining and related issues to public interest groups, as well as tribal, state and federal agencies and governments.

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ABOUT MINERAL POLICY CENTER

Mineral Policy Center (MPC) is a nonprofit environmental organization dedicated to protecting communities and the environment from the impacts of irresponsible mining in the U.S. and worldwide. MPC's programs and activities include mining-related research; public outreach; regulatory and legislative reform of mining laws; initiatives to improve company practice; and community organizing. MPC is supported by membership and foundation grants.

Join MPC and help protect the land, water, wildlife, and natural resources for future generations. Donations are tax deductible.

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I. Executive Summary

American taxpayers today are potentially liable for \$1 billion to more than \$12 billion in clean-up costs for hardrock mining sites—those designed to extract metals. Because mining companies are inadequately insured to pay for cleaning up their toxic pollution, the public is left with staggering costs for something as basic to human life as clean water.

Abandoned mine sites litter the landscape of the western United States, leaving a legacy of pollution. And currently existing mines are likely to produce even more polluted streams and scarred lands.

In modern mining, reclamation bonds and similar forms of financial assurance are intended to guarantee that if a mining company is unable or unwilling to clean up after a mine closes, funds will be available to remedy and prevent pollution at the site. The amount of financial assurance put forward by a company is based on estimated costs for clean-up and reclamation.

Estimated Hardrock Mine Reclamation Financial Assurance Liability by State

State	Disturbed Acres	Existing Financial Assurance	Existing Financial Assurance, \$/acre	Estimated Minimum Shortfall, %	Estimated Minimum Liability	Estimated Maximum, \$/acre	Estimated Maximum Liability
Alaska	3,561	\$37,462,910	\$10,520	50%	\$18,731,455	\$50,000	\$140,587,090
Arizona	78,837	\$146,456,779	\$1,858	50%	\$73,228,390	\$50,000	\$3,795,393,221
California	6,286	\$30,983,770	\$4,929	50%	\$15,491,885	\$50,000	\$283,316,230
Colorado	10,971	\$97,594,745	\$8,896	50%	\$48,797,373	\$50,000	\$450,955,255
Idaho	5,790	\$40,110,236	\$6,928	50%	\$20,055,118	\$50,000	\$249,389,764
Montana	13,524	\$213,794,400	\$15,809	50%	\$106,897,200	\$50,000	\$462,405,600
Nevada	100,410	\$475,548,642	\$4,736	50%	\$237,774,321	\$50,000	\$4,544,951,358
New Mexico	18,985	\$275,137,000	\$14,492	50%	\$137,568,500	\$50,000	\$674,113,000
South Dakota	2,186	\$30,949,000	\$14,158	50%	\$15,474,500	\$50,000	\$78,351,000
Utah	30,915	\$50,898,471	\$1,646	50%	\$25,449,236	\$50,000	\$1,494,851,529
Washington	79	\$3,346,451	\$42,360	50%	\$1,673,226	\$50,000	\$603,549
Total	271,544	\$1,402,282,404	\$5,164		\$701,141,202		\$12,174,917,596

However, these estimates—and the resulting financial assurance—usually fall short of actual reclamation and closure costs. As illustrated by the chart on page 2, taxpayers throughout the western U.S. face huge clean-up costs as a result.

Financial assurance is a prerequisite of responsible business practice. Mining has significant long-term environmental impacts. Due to massive quantities of toxic waste, mines significantly threaten clean water and other natural resources. More than 40 percent of the headwaters of all western waterways have sections that are polluted by mining, according to the Environmental Protection Agency (EPA). The EPA also ranks the mining industry as the nation's top toxic polluter, reporting more toxic releases annually than any other industry sector.

Since 2001, some mining companies have reported difficulty securing financial assurance in the form of surety bonds for their operations. It is true that financial assurance is increasingly expensive—and cash equivalents are even more expensive than bonds. However, the reasons offered by mining companies for this trend do not correctly explain the problem.

Surety companies that provide legitimate financial guarantees are responding—as expected in a market economy—to greater risk. In the past few years, mining companies have demonstrated in case after case that the cost, time frame and extent of clean-up have been substantially underestimated by regulators who set bond amounts.

Due to a spate of mining company bankruptcies, surety providers have made significant payouts in recent years. In response, the surety industry has increased its rates. In fact, testimony by representatives of surety companies demonstrates that mine reclamation bonds are more risky than their other investments.

Further, recent state and federal regulatory actions have provided more realistic estimates on mine reclamation projects, which can last for more than 100 years. This underestimation was predicted three years ago in *Hardrock Reclamation Bonding Practices in the Western United States*.

A variety of financial assurance mechanisms exist—a bond is only one example. Whatever its form, financial assurance must provide an ironclad guarantee that clean-up funds will be available, irrespective of the mine operator's finances at the time of mine closure or bankruptcy.

One of the most problematic practices involves corporate self-guarantees. Rather than acquiring a real form of financial assurance, some mines are allowed to proceed based on a mining company's good-faith pledge to finance clean-up. Following the corporate responsibility scandals of companies like Enron and WorldCom, clearly something beyond the pledge of a CEO is needed to protect taxpayers from footing the bill for mine clean-ups that often cost hundreds of millions of dollars.

This publication submits that:

- adequate tools exist for the mining industry to meet its financial obligations and fully guarantee clean-up of modern mining operations;
- federal and state regulators should not weaken financial assurance regulations or delay implementation;
- regulators should enforce and/or strengthen provisions to protect communities, taxpayers and valuable natural resources such as clean water;
- all proposals calling for companies to provide self-guarantees, rather than real forms of financial assurance, should be rejected by regulators;
- strong financial assurance provisions should include ironclad guarantees and mine operators must factor realistic closure and reclamation expenses into the costs of doing business.

This publication also:

- recommends responses to current dynamics in the surety bond market;
- identifies underlying causes and trends;
- examines recent changes in state and federal enforcement and regulation;
- provides concrete evidence on the need to maintain and strengthen enforcement;
- describes the workings and importance of financial assurance for mine closure and reclamation; and
- offers case studies.

The solutions to both the mining industry's scarcity of surety bonds and taxpayers' potential multi-billion dollar reclamation liability are relatively straightforward. Neither case calls for weakened mining regulations. To the contrary, better use of existing rules and stronger financial assurance provisions prove the remedy.



II. Background

Modern hardrock mines—those designed to extract metals—can and often do create large-scale environmental problems. Modern mines disturb thousands of acres of land and pollute water resources with acid drainage and processing chemicals such as cyanide, as well as other toxic and carcinogenic contaminants. The U.S. Environmental Protection Agency (EPA) identifies 40 percent of the headwaters of western watersheds as having sections that have been polluted by mining.¹ The EPA also identifies hardrock mining as the nation’s largest producer of toxic materials; the mining industry was responsible for almost half of all toxics reported by U.S. industries in 2000.²

Too often in the recent past and today, operators of large-scale mines have predicted that rather than engaging in costly mine clean-up and reclamation, they can “walk away” from a mine after minimal closure activities. However, this “walk away” scenario has yet to come true for a single modern major mine. In case after case, mining company officials and regulators have failed to acknowledge the hard realities of mine reclamation. For example, acid drainage is a particularly difficult and costly problem to remedy, and it can have significant negative impacts on clean water. Companies cannot simply “walk away” from mines that are causing acid drainage. Even where mines do not have acid drainage problems, clean-up often is more difficult than expected and takes longer than anticipated, becoming extremely costly.

In response, where significant hardrock mining activities occur in the U.S., many states and the federal government have enacted regulations that in some form require reclamation and closure plans to address problems associated with modern mining operations.

All these regulations include, at least nominally, a financial assurance provision. The various forms of financial assurance, sometimes referred to collectively as bonding, are designed to ensure money will be available for a governing authority to conduct reclamation and closure, in case a company declares bankruptcy or refuses to complete required post-mining activities. Financial assurance is intended to ensure that polluters—not taxpayers—pay the costs of mine reclamation and closure.

Existing regulatory approaches have been tested during the past decade. As modern mines have reached closure—with some companies going bankrupt or otherwise defaulting—regulatory agencies have sometimes been forced to conduct reclamation and closure tasks, to comply with current envi-

ronmental regulations, and to actually incur costs for conducting those activities.³ In general, existing financial assurances are lacking, as illustrated by these experiences with modern mines:

- the extent of disturbance and contamination, and in particular the long-term threat of pollution of water resources, is greater than previously predicted;
- the potential is real for bankruptcies and other circumstances that lead to default on required reclamation;
- costs associated with such defaults are much greater than expected;
- state and federal agencies' costs for conducting reclamation and closure tasks at a mine are typically higher than estimated by mining companies; and
- as a result, financial assurance is generally inadequate, or in some cases the intended funds are totally unavailable (as in the case of self-guarantees).

Some state and federal agencies have recently responded by strengthening enforcement of existing regulations and/or enacting new regulations. For example, the state of Montana has re-evaluated reclamation plans and financial assurance for many of the mines in the state. In many cases, new reclamation plans are now required. Financial assurance amounts required by the state have increased by 50 percent in almost all cases, and by as much as 10,000 percent or more in some cases. At ASARCO's Black Pine mine, a \$70,000 financial assurance originally was posted. However, the state of Montana is now requesting an \$8 million assurance.⁴

The state of New Mexico has enforced its reclamation and closure and financial assurance regulations, proposing financial assurance amounts for the Chino, Tyrone, and Continental mines that will result in increases of 500 percent or more.⁵ And the Bureau of Land Management (BLM), under the Bush Administration in 2001, retained regulations proposed by the Clinton Administration in 1999 to require real, full-cost financial assurance, prohibiting future corporate self-guarantees.

In addition to these governmental responses, there has been a market response. The surety bond industry has recognized that mine reclamation and closure bonds are now comparatively high-risk investments. As a result, many are either limiting or canceling their existing surety bonds with mining companies and refusing to issue new ones.⁶ This market correction has increased the surety industry's rates and made it more risk-averse.

A representative of the surety industry trade association testified before the U.S. Congress that mine reclamation bonds are increasingly scarce due to greater risks and costs. Driving factors include uncertainty about bond duration, new regulatory requirements, concerns about enforcement circumstances not described in original reclamation plans, and concerns about whether

surety companies can reclaim mines independently rather than paying the bond amount.⁷ These developments do not call for weaker bonding and reclamation requirements. In each case, the existing Department of Interior surface mining regulations address the surety industry's concerns. Interior Department regulations already allow:

- concurrent and incremental reclamation which would allow for a decrease in bond duration;
- the use of trust funds, established by mining companies and separate from bonds, to cover long-term uncertainties not foreseen in original reclamation plans, such as perpetual water treatment;
- independent third parties to estimate reclamation and closure costs, removing the incentive to underestimate costs; and
- surety companies to potentially reclaim mines rather than paying the bond amount.⁸

The appropriate regulatory response, and the one that will protect public interest, is full implementation and clarification on exactly how these provisions will be enforced.

OTHER CAUSES OF SURETY BOND SCARCITY

Before 2001, the risks associated with mine closure already were on the rise. Then, in 2001, a confluence of events occurred to further undermine the “walk away” reclamation paradigm, leading to intensified market correction.

Before 2001, the insurance industry generally provided surety bonds for mining companies. The cost of the surety bonds typically ranged from \$5 to \$20 per \$1,000 dollars of insured valued (0.5 percent to 2 percent), paid on an annual basis. Companies generally were required to demonstrate a certain level of financial capability to qualify for surety bonds, but as default was rare, the level of scrutiny was typically marginal. Acquiring a mine reclamation bond was relatively easy because regulators and surety bond investors still believed in the validity of the “walk away” mine reclamation scenario.

During 2001, surety companies began to realize that cleanup and closure of modern mines is significantly more expensive than was projected. In addition, several other significant factors negatively influenced the surety market:

- U.S. economic growth stalled;
- the stock market started a steady decline;
- a series of multibillion dollar companies such as Enron and WorldCom declared bankruptcy;

- the demise of Enron and Arthur Andersen destroyed market faith in the accurate financial reports of fiscal liabilities; and
- the tragic terrorist attacks took place on September 11, 2001.

THE MYTH OF “WALK AWAY” MINE CLOSURE

Hardrock mines disturb land in the form of open pits, underground subsidence areas, waste rock piles, tailings impoundments and millions of tons of toxic waste, as well as cyanide and sulfuric acid leach piles. The footprint of a mine can cover an area equivalent to hundreds of football fields—containing exploration areas, mine and mill facilities, and other disturbances. If not reclaimed, these sites have the potential to pollute water resources for thousands of years. For example, as rain and snow melt, they infiltrate mined areas and leach (or dissolve) contaminants that run off into surface water and groundwater.

The underlying premise behind “walk away” mine reclamation is that a company can complete some limited reclamation and leave the site with no further environmental responsibility or liability. Depending upon jurisdiction, this model predicts “reclamation success” will occur two to twelve years after a mine closes, at which time the company can literally “walk away” from any further reclamation. In most cases, at this point mining companies and regulating governments assume the site’s waste to be non-acid generating or otherwise unlikely to cause long-term contamination of water quality. Given that assumption, reclamation typically consists of the following tasks:

- limited resloping of some disturbed areas to prevent erosion;
- possible application of growth medium (preferably salvaged topsoil);
- reseeding; and
- limited short-term surface water control and management.

Despite repeated use of this “walk away” scenario in virtually every environmental assessment or environmental impact statement for mines in the U.S., major mines are rarely—if ever—successfully reclaimed under the “walk away” approach. Evidence shows that “walk away” does not reflect actual reclamation and closure requirements or costs.

Many U.S. mine sites in the reclamation/closure phase have violated water quality standards, Clean Water Act regulations, and other federal and state laws. While industry and regulatory environmental analysis always predicts 100 percent environmental compliance for every mine site before mining begins, results regularly contradict these predictions—especially after mining has been completed, profits have been taken, and cleanup costs begin to build.

Colorado's Summitville Mine

One of the most dramatic mine bankruptcy cases in modern times was the Galactic Resources' Summitville mine disaster that occurred in southern Colorado in 1992.

In 1984 the state of Colorado issued a permit to Canadian-owned Galactic Resources to operate an open pit gold mine. The mine used a heap leaching process that stacked gold ore on plastic liners and sprinkled it with a cyanide solution to leach out the gold. The gold containing cyanide solution was then collected from a pool at the foot of the ore pile for further processing.

The Summitville mine site was built in a location approximately 11,500 ft. in altitude in the southern San Juan Mountains, in an area that receives over 400 inches of snowfall annually. The mine site is located at the head of the Alamosa River watershed in an area of extensive historic mining activity. In addition, the area of the open pit and leach pads is geologically unstable and prone to slides and settling.

In late 1992 Galactic Resources declared bankruptcy and the site was abandoned. In December of 1992, after the heap leach system overflowed and essentially killed an 18-mile stretch of the Alamosa River, the state of Colorado requested that the Environmental Protection Agency (EPA) respond to the mine site on an emergency basis.

When Galactic Resources declared bankruptcy, the existing financial assurance required by the state of Colorado was only \$4.5 million. Of that amount, \$2.3 million was in cash and the remainder was in liens on the company's equipment.⁹ The first year's costs to manage the site alone exceeded the amount of available financial assurance.

Since taking over and designating Summitville as a Superfund site, the EPA has estimated total cost for the ensuing cleanup at approximately \$180 million, with the majority of that amount attributed to Galactic Resources operations. Although the federal government and the state were able to collect \$28 million as part of a bankruptcy settlement reached in 2000, the total cost to taxpayers is expected to reach \$150 million or more.¹⁰



Photo: Mineral Policy Center

Investigations at mine sites consistently reveal violations of water quality standards for sulfates; toxic and carcinogenic metals such as lead, cadmium, zinc, mercury and copper; metalloids such as arsenic and antimony; poisonous chemicals such as cyanide and sulfuric acid; and nutrients such as nitrate. These are all symptoms of the activities and processes used in mining.

And the problem is quite severe. The EPA reports that in 2000, the metal mining industry was the nation's largest toxic polluter. Almost half of all reported toxics in the U.S were produced by the hardrock mining industry—3.34 billion out of 7.1 billion pounds of toxics.¹¹

Where acid drainage and associated pollution occurs, harming water resources and potentially affecting human health, reclamation and closure costs are increased. Necessary measures include source controls and groundwater and/or surface water remediation. Source controls consist of effectively resloping, covering and revegetating all disturbed areas contributing to acid drainage. This is intended to minimize infiltration of precipitation into acid-generating materials, and to limit surface erosion and runoff.

In many cases, even with adequate surface reclamation, groundwater and/or surface water contamination occurs. This necessitates additional measures to “capture and treat” the pollution. Typically, groundwater or surface water capture systems are installed. If the captured water does not meet discharge standards, it is sent to a water treatment system where it is processed until it meets discharge standards. Although water treatment can effectively treat contaminated mine water, the collection of the water itself is often problematic. Additionally, water capture and treatment costs can be significant.



III. Mine Reclamation and Closure Liability

In 2000, the Center for Science in Public Participation completed the first detailed report on reclamation and closure planning and financial assurance. *Hardrock Reclamation Bonding Practices in the Western United States* examines various financial assurance regulations and practices of responsible state and federal agencies, providing a critique of the ways in which these responsibilities are manifested in each jurisdiction.¹²

As described in the various case studies accompanying this report, numerous small and medium-sized mining companies have declared bankruptcy in the last 10 years. In addition, several more companies, including mining giant ASARCO, could be on the verge of declaring bankruptcy. The resulting costs for governments and taxpayers to date likely exceed \$250 million. That amount could grow to more than \$1 billion if ASARCO alone fails to adequately provide for its mine reclamation and closure requirements.¹³

A review and update of the conclusions and recommendations from that study reveals the following:

- The total potential financial assurance liability for hardrock mining in all the Western states was probably significantly underestimated at \$1 billion in 2000.
- Inadequate reclamation and closure planning remains the norm in all states, although Montana and New Mexico have made significant improvements. Insufficient financial assurance regulation and enforcement persist as well. States with the weakest reclamation and financial assurance requirements continue to be Arizona and Nevada because they allow corporate self-guarantees and in some cases lack current site-specific reclamation plans.
- All states continue to have significant regulation weaknesses, such as failing to adequately account for agency costs, allowing non-cash equivalent forms of financial guarantees, and disregarding potential environmental impacts.

- In the event of bankruptcy or other circumstances requiring the use of financial assurance, regulatory agencies incur additional indirect costs of about 50 percent greater than that typically contained in mining industry cost estimates.

Actual clean-ups prove that mines with acid drainage cost much more to reclaim. Acid-generating mines pollute surface water and groundwater with toxics and carcinogens, requiring more expensive surface reclamation and long-term water treatment—sometimes in perpetuity. As a result, acid generating mines' clean-up is an order of magnitude more expensive than that of non-acid generating mines—\$20,000 to \$100,000 more per acre.

In the event of a mining company's default, the form of financial assurance can greatly affect the ability of a governmental agency to actually collect money for necessary reclamation and closure.

The analysis shows that the total estimate of potential taxpayer liability is \$1 billion at the low end, but it could be as high as \$12 billion. This represents the total cost to state and federal governments for mine reclamation and closure at all operating hardrock mines, less the total amount of financial assurance posted (see Appendix for full mine list and liability estimation methodology).

Because mining operators usually estimate the amount required for financial assurance, and because they have little financial or regulatory incentive to provide full-cost estimates, taxpayer liability will continue to grow until regulations are either fully implemented or strengthened.

Table 1 shows the ten mines in the U.S. with the largest maximum estimated potential taxpayer liability. The estimated liability is based on \$50,000 per acre and ranges from \$300 million to \$1.35 billion for the ten mines. Rio Tinto Kennecott's Bingham Canyon copper mining operation in Utah has the highest estimated liability of \$1.35 billion. This estimated liability doesn't include expenditures already made on reclamation, including more than \$337 million already spent by Kennecott.¹⁴ Phelps Dodge has the mines with the second, fourth, sixth and tenth largest estimated reclamation liability. The Morenci and Sierrita copper mines in Arizona and the Chino and Tyrone mines in New Mexico have a combined liability of approximately \$2.1 billion. Newmont Gold Company owns the third and eighth mines on the list—the Twin Creeks and Gold Quarry mines in Nevada—with a combined liability of approximately \$1 billion. ASARCO has the fifth and seventh largest mine reclamation liabilities in the Ray and Mission mines in Arizona, with a combined estimated liability of approximately \$870 million. All mines on this list are potentially acid-generating and will most likely require long-term or perpetual water treatment. Reclamation and closure of these mines will potentially cost more than \$50,000 per acre.

TABLE 1: Top 10 Mine Taxpayer Liabilities in the U.S. by State

Rank	Mine	State	Ownership	Commodity	Existing Financial Assurance	Estimated Cost at \$50,000/acre	Estimated Shortfall or Liability
1	Bingham Canyon	UT	Rio Tinto/Kennecott	Copper	\$33.2M	\$1,350.0M	\$1,316.8M
2	Morenci	AZ	Phelps Dodge	Copper	\$14.3M	\$948.4M	\$934.1M
3	Twin Creeks	NV	Newmont Gold	Gold, Silver	\$35.6M	\$672.4M	\$636.8M
4	Chino	NM	Phelps Dodge	Copper	\$60.0M	\$460.0M	\$400.0M
5	Ray	AZ	ASARCO	Copper	\$0.8M	\$457.9M	\$457.1M
6	Sierrita	AZ	Phelps Dodge	Copper	\$18.3M	\$422.3M	\$404.0M
7	Mission	AZ	ASARCO	Copper	\$3.0M	\$417.9M	\$414.9M
8	Gold Quarry	NV	Newmont Gold.	Gold, Silver	\$61.0M	\$400.2M	\$339.2M
9	San Manuel	AZ	BHP Copper	Copper	\$33.5M	\$376.6M	\$343.1M
10	Tyrone	NM	Phelps Dodge	Copper	\$50.0M	\$300.0M	\$250.0M
Total					\$0.3B	\$5.8B	\$5.5B

Montana's Zortman-Landusky Mine

Pegasus Gold, a Canadian gold mining company, operated the Zortman-Landusky gold mine complex in the Little Rocky Mountains of north-central Montana. The mine, originally permitted in the late 1970s, was the first large-scale open-pit cyanide heap leach mine in the United States.

According to the Supplemental Environmental Impact Statement addressing the mine's reclamation and closure, in 1992 the Montana Department of Environmental Quality (MDEQ) reported that cyanide and heavy metals from the mine had contaminated water.¹⁵ In 1995, Pegasus agreed to pay \$36 million to settle state, federal and tribal lawsuits, of which \$32 million was to be directed towards water management and treatment facilities.

Pegasus Gold declared bankruptcy in 1998, after which the MDEQ and Bureau of Land Management (BLM), which shared responsibility with the state for the site, assumed control of the mine. At that time no surface reclamation had been performed on more than 85 percent of the site, and problems related to cyanide and acid drainage discharge were evident.

After the bankruptcy, the Fort Belknap tribes filed a federal lawsuit questioning the adequacy of the proposed reclamation. Following extensive investigations, the state and federal agencies chose a preferred alternative totaling \$52.1 million for surface reclamation. However, the existing amount of financial assurance for surface reclamation was approximately \$29.6 million. This left a \$22.5 million shortfall in the surface reclamation costs covered by the bond. State and federal agencies acknowledge that this shortfall does not include the cost of water treatment in perpetuity (i.e. for at least 1,000 years). Water treatment will cost another \$11 million for a total shortfall in cleanup costs of \$33.5 million.

The Pegasus Gold bankruptcy also provides a poster child for irresponsible corporate behavior. Just before declaring bankruptcy, the board of directors of Pegasus voted for its own members more than \$5 million in bonuses. Then they created a new company, Apollo Gold, consisting of the remaining profitable assets of Pegasus Gold. While taxpayers are paying Pegasus's' clean-up bills for Zortman-Landusky, Pegasus's' executives have cashed in and started a new company based on the company's valuable assets.



Photo: Mineral Policy Center



IV. Reclamation, Closure and Financial Assurance

The following sections provide basic understanding of reclamation and closure concepts: planning and tasks, cost estimation, and financial assurance.

The full cost of mine reclamation and closure is invariably more than cost estimates generated under the commonly used “walk away” scenario. Experience shows that acid-generating sites often cost up to ten times more than a “walk away” estimate. Even for nonacid-generating sites, direct reclamation costs can exceed industry-favored “walk away” estimates by two or three times.

Too often, financial assurance estimates result from negotiations between mining companies and regulators. It is not a neutral, impartial process. Usually companies successfully negotiate a final amount that underestimates the real costs of third-party reclamation and closure.

The estimator of a mine’s financial assurance, and therefore a mine’s reclamation and closure costs, must calculate two types of costs: direct costs and indirect costs. Direct costs are those stemming from the necessities of physical reclamation and closure, e.g. the cost of revegetating a slope. Indirect costs are those accrued by a mining company’s default—that is, the additional cost involved when a third-party contractor revegetates a slope versus what it would have cost the mining company to revegetate the slope.

Reclamation and closure costs can be estimated using one of three different methods. The preferred method involves an objective, qualified professional engineer using fundamental principles of engineering cost estimating. This method relies on an informed assessment of site characteristics such as hydrology and geochemistry, and an accurate estimate of material quantities, distances, and other quantifiers based on site-specific information to determine direct costs. Recognized methods are used to determine equipment, labor, materials and supplies costs that can be converted into per-unit costs. This method relies on industry-accepted references, including the *Caterpillar Performance Handbook*, *Means Heavy Construction Cost Data*, and actual vendor and/or contractor quotes for the same or similar requirements.

Another method is for a mining company or a third-party contractor employed by the company to make the cost estimate. In both cases, recent history has demonstrated that companies and their contractors often cut corners to reduce these cost estimates.

In some cases a company submits the majority of cost estimate information, and in other cases governing agencies generate the necessary information. It is generally accepted in principle, but often not carried out in practice, that the government regulator is responsible for ensuring that the reported conditions accurately represent the site-specific situation. Government regulators' lack of adequate time and knowledge often lead to insufficient oversight.

Accurate information on acid drainage characterization, ground water and surface water pollution, potential human health and other environmental impacts, as well as myriad other factors, are necessary for an accurate cost estimate. Given that direct costs can increase by 200 percent to 1,000 percent or more in the event of acid drainage or other harmful impacts, this is probably the most important single aspect of mine reclamation and closure planning. Unfortunately, acid drainage is too often inaccurately predicted. It is worth noting that a permit is unlikely to be issued for a proposed mine where acid drainage is predicted, but in reality it is relatively common for acid drainage to occur in sulfide-containing ore bodies.

Following the estimation of direct costs, indirect costs also must be estimated to reflect the amount of financial assurance actually necessary. Combined total indirect costs are typically 40 percent to 60 percent of direct costs. However, state and federal agencies currently apply indirect costs of 0 percent to 45 percent. This is one of the most common sources of underestimation. Indirect costs should include at a minimum the following:¹⁶

- **Contingency** costs generally reflect the level of detail and completeness of the cost estimate, as well as the degree of uncertainty of the various factors and assumptions used in the estimate. The less complete the reclamation plan, the higher the contingency costs. Contingency costs range from 2 percent to 10 percent of direct costs.
- **Mobilization and demobilization** costs are for the transport of equipment and materials, (offices, facilities, man camps) to and from the project site, as well as infrastructure needs. These costs range from 0.2 percent to 2.0 percent of direct costs.
- **Engineering redesign** costs stem from lack of detailed information and/or plan development sufficient for an accurate cost estimate. In most cases of mine bankruptcy during the past 10 years, little or no detailed information has been available for reclamation and closure, and significant engineering redesign has been necessary. Unless detailed plans are available, engineering redesign costs range from 2 percent to 5 percent of direct costs.

- **Engineering, procurement and construction management** costs generally range from 5 percent to 10 percent of direct costs.
- **Contractor overhead** covers administrative, management, public relations, safety, environmental, legal, performance bonding and other costs of doing business. They range from 10 percent to 20 percent or more of direct costs, depending on such requirements as governmental administrative oversight, and safety and health requirements.
- **Contractor profit** generally ranges from 5 percent to 15 percent of direct costs.
- **Agency administration** costs are incurred by state and federal agencies when sites are abandoned or the operator fails to behave responsibly. In many cases, the agencies, lacking available and experienced personnel, are forced to hire contractors to perform oversight and other duties. The cost of agency administration can range from 2 percent to 10 percent of direct costs.
- **Cost escalation** is necessary because cost estimates are typically based on information and costs for a particular year, making it necessary to account for inflation for the period of proposed financial assurance. The recommended cost escalation is based on an estimated 3 percent per year, which is roughly equivalent to the average cost escalation that has been incurred over the past 25 years.¹⁷

TYPES OF FINANCIAL ASSURANCE

Usually mandated by the regulating authority, financial assurance is a form of insurance purchased by a mine operator before mining begins. In theory it ensures that, should a mining operator be unable or unwilling to pay to reclaim the mine when mining ceases, the regulating authority can use the assurance to fund mine cleanup. Financial assurance can be made in one of three general forms, with varying allowances in each state or by each federal agency. It is not uncommon for one mining operation to be assured using combinations of forms, including combinations of all three types.

1. **Forms of cash or equivalent.** Cash or its equivalent is the preferred form of financial assurance, as it is the most secure and readily available in the event of a mining company's default. Forms of cash or equivalents include irrevocable letters of credit (bank guarantees), certificates of deposit, government bonds and trust funds. Cash financial assurance, together with an accurate assessment of reclamation requirements, is the best protection for taxpayers against paying for clean-up. Where closure costs are long-term (in many water treatment situations, costs are "in perpetuity"), forms of cash such as trust funds are the only practical way to provide a financial guarantee.

Because surety bonds have been readily available and cheap in the past, cash financial assurance has been uncommon. In 1999, it accounted for approximately 10 percent of total financial assurance at all mines in the U.S., but now that number has probably increased to 50 percent or more in some states.

- 2. Surety bonds.** Bonds are guarantees from an insurance company or its equivalent for the performance of reclamation and closure work. Surety bonds are generally assumed to be applicable to low-risk circumstances where the surety bond company, in the event of mining operator default, can expect to hire another contractor to perform the work. Surety bonds are for a set amount of money and have the option of being cancelled or renewed on a regular (typically yearly) basis. Although surety bonds are considered an acceptable form of financial assurance, experience has shown that the amount of payout is likely to be reduced by 10 percent to 20 percent or more as a result of negotiation by the surety company. A surety company also has the option of performing the work (although this is rarely done at mine sites). Government agencies often erroneously assume that a surety bond will pay out all the funds at once, whereas surety companies are almost certain to make the payments as reclamation and closure activities occur. Without cost escalation and other indirect costs included, surety bonds significantly under fund reclamation – explaining the surety industry’s reluctance to actually perform reclamation at mine sites. An additional risk to taxpayers is the stability of the surety companies. Some surety companies involved in hardrock mining have gone bankrupt during the past decade.

Surety bonds accounted for about 40 percent of financial assurance at all U.S. mines in 1999. Until recently, in states where corporate self-guarantees are not allowed, bonds accounted for approximately 80 percent of all financial assurance. As a result of current circumstances, it appears that the total amount of surety bonds may shrink to less than 25 percent in 2003.

- 3. Self-guarantees.** A corporate self-guarantee is a pledge made by a mining company or its parent company, which is typically also a mining company. Although corporate self-guarantees are sometimes accompanied by financial tests as a measure of qualification, in some states the financial test amounts to little more than the existence of a business license. In states where financial tests exist, experience has shown that companies have gone bankrupt, but continued to meet those tests right up to the moment of their filing for bankruptcy protection.

No hard assets, cash, or cash equivalents stand behind a corporate self-guarantee. Consequently, while they are allowed in some states, self-guarantees should not be considered an acceptable form of financial assurance because any payout at all is doubtful. Replacing a corporate self-guarantee with another form of financial assurance once a company experiences financial difficulty also is problematic.

Corporate self-guarantees and equivalents accounted for about half of all mining financial assurance in the U.S. in 1999. Currently, corporate self-guarantees are not allowed under the

new Bureau of Land Management's (BLM) 3809 regulations or on federal lands administered by the U.S. Forest Service. But in states like Nevada and Arizona, where corporate self-guarantees are allowed, they account for 75 percent to 100 percent of total financial assurance.

Nevada's Gold Mining Bankruptcies

The following facts were provided by the Nevada Department of Environmental Protection (NDEP) in 2002:¹⁸

NDEP Mine Financial Assurance Forms and Amounts

Instrument	Number	Total Dollar Amount
NDEP Surety Bonds	24	\$23,248,458
NDEP Letters of Credit	5	\$5,727,690
NDEP CDs and TDs	14	\$827,586
NDEP Trust	1	\$1,168,904
Corporate Guarantees	40	\$237,295,617
State Bonding Pool	14	\$1,095,639
USFS Instruments	17	\$13,864,599
BLM Instruments	117	\$224,949,257
Total		\$508,177,750

In Nevada, 27 mines declared bankruptcy as of July 15, 2000.¹⁹ Of these mines, 23 were bonded. Total bond liability was \$5.2 million. Given that the total of identified liability for all Nevada mines is just over half a billion dollars and the total of all bond defaults as of July 15, 2000, was just over \$5.2 million, why are surety companies unwilling to continue bonding Nevada mining operations? With an average 2 percent premium, the surety industry should be making almost \$10,000,000/year for the \$5.2 million liability over several years. It appears the surety industry has examined the outstanding liabilities at Nevada mines and determined that the current bonds are inadequate to cover remaining liabilities.

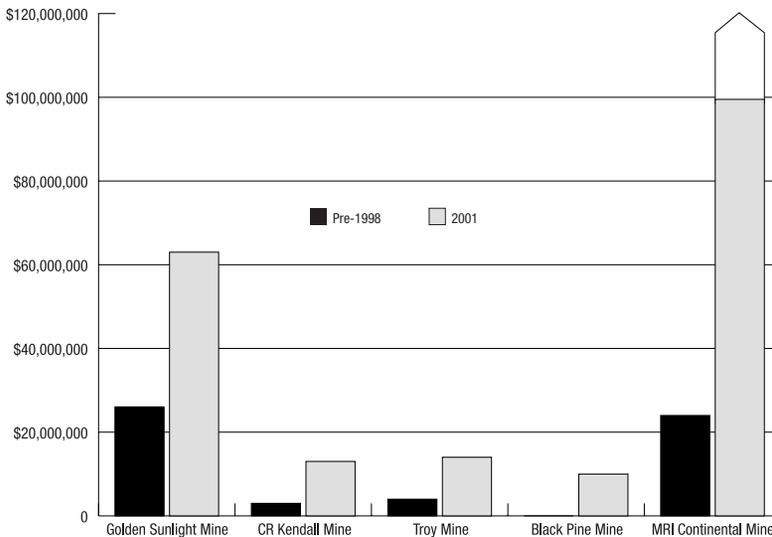
V. Changes in Regulation and Enforcement

Following a series of mine bankruptcies in the late 1990s, some state and federal jurisdictions have significantly changed their regulatory approaches to reclamation and/or financial assurance. The most notable reforms occurred in Montana, New Mexico, and within the BLM's 3809 federal surface mining regulations. These changes represent a significant step towards protecting taxpayers from the environmental costs of modern mining. The following sections describe the circumstances that led to these changes and their significance.

A. MONTANA

The bankruptcy of Pegasus Gold in 1998 demonstrated the inadequacy of Montana's then-existing reclamation planning processes and financial assurance estimates. Of the state's 13 major hardrock mines, six were owned by Pegasus Gold Company. Together, these mines accounted for approximately 3,000 acres of disturbance and an aggregate financial assurance of approximately \$100 million.

Figure 1: Montana Hardrock Mine Bond Increases – Pre-1998 and 2001



After Pegasus' federal bankruptcy proceedings, Montana, the BLM and the U.S. Forest Service were left with responsibility for the Basin Creek, Beal Mountain and Zortman-Landusky gold mines. All these sites are former open pit cyanide heap leach operations. Subsequent investigations and actions by state and federal agencies revealed a financial assurance shortfall of at least \$40 million.

As a result of investigations carried out by the Montana Department of Environmental Quality (DEQ), the state mandated changes to reclamation plans in some cases and increased financial assurance amounts at nearly every mine site, as illustrated by the figure above. Financial assurance increases have ranged from 50 percent to more than 10,000 percent. The only major mine where the state has not yet increased the bond amount is the Montana Resources Incorporated (MRI) Continental mine, 49 percent of which is owned by ASARCO. As the figure indicates, the amount of financial assurance necessary at MRI could be greater than \$100 million; however, the existing financial assurance is only approximately \$25 million. Because Montana DEQ did not act in time, it will be difficult to obtain greater financial assurance from either ASARCO or Denny Washington, the other major partner in the mine, as both are experiencing financial difficulties. In 2000, Montana DEQ, together with public interest groups and others, successfully strengthened reclamation and financial assurance provisions of the state's Metal Mine Reclamation Act. The strengthened law reinforces the state's authority to require financial assurance for water treatment and other long-term obligations that the department had not recognized as critical prior to the Pegasus bankruptcy.

It is likely that 10 of the 13 major mines in Montana will require water treatment in perpetuity.²⁰ Consequently, Montana DEQ, the BLM and the U.S. Forest Service (i.e., the taxpayers) will permanently own and operate water capture and treatment systems as part of mining's toxic legacy.

B. NEW MEXICO

With the passage of the New Mexico Mining Act in 1994, this state became one of the last to enact regulations requiring mine reclamation. The law provides a relatively progressive regulatory framework. It recognizes that site assessment, reclamation and closure planning, and accurate cost estimates are key to establishing adequate financial assurance. The law also required all mines to submit acceptable reclamation and closeout plans, and to post financial assurance by 1996.

However, under industry pressure, the compliance deadline was extended from 1996 to 1998, and again in 1998 to the end of 2001. By the end of 2001 reclamation and closeout plans and financial assurance had been posted at nearly all of the mines in the state—numbering more than 100—except for the Chino, Tyrone and Continental copper mines owned by Phelps Dodge Corporation. These mines all have existing acid drainage generation problems and the potential to impact groundwater and surface water for many years to come. As a result, reclamation and financial assurance required under the new law are likely to be very expensive.

New Mexico's Molycorp Mine

Under threat of inclusion on the Superfund National Priorities List, the state of New Mexico Environment Department and Mining and Minerals Division completed negotiations with Molycorp over financial assurance requirements for the Questa molybdenum mine (so called because it sits upstream of the town of Questa) in May of 2002, resulting in a total \$156 million estimate for financial assurance.²¹ The amount was the largest single reclamation and closure financial assurance amount ever established in the U.S.

The financial obligation for the Questa mine may not end with the \$156 million. The Questa mine operations created extensive waste rock piles and tailings and an open pit with very high acid drainage potential that has already impacted the nearby Red River and groundwater aquifers with sulfate and metals contamination. Further investigations by state agencies and the Environmental Protection Agency under Superfund are ongoing. Potential reclamation and closure costs have been estimated as high as \$400 million for the site.



Photo: Lighthawk

Combined with the New Mexico Groundwater Quality Rules enforced by the New Mexico Environment Department, which also has authority to require financial assurance for mine reclamation, the state has the potential to enact responsible reclamation and closure plans and adequate financial assurance amounts, provided the state acts properly and promptly.

As of early 2003, under a new administration, New Mexico continues to negotiate with Phelps Dodge over the financial assurance requirements for the Chino, Tyrone and Continental mines.

- **Chino:** The New Mexico Environment Department (NMED) initially estimated the financial assurance at \$780 million—an amount necessary to fund a reclamation plan that would address the site’s significant acid drainage generation. However, after considerable political pressure by Phelps Dodge, the state reduced this to \$391 million in early 2002.²² A recent decision by the NMED has increased the amount slightly to around \$396 million. The amount, which Phelps Dodge has yet to post, would be the highest total financial assurance for any mine site in the U.S., although it is not atypical of other large mines in the United States.
- **Tyrone:** New Mexico has proposed a \$430 million financial assurance for the Tyrone mine, while Phelps Dodge has proposed a \$340 million financial assurance.²³ Negotiations continue over what will likely be the second highest total financial assurance amount for any mine in the U.S.
- **Continental:** The financial assurance is undetermined, but is expected to be around \$50 million.

The combined financial assurance for these three mines is expected to be at least \$820 million. However, other estimates put the collective liability for these mines, all owned by Phelps Dodge, in excess of \$1.5 billion.

New Mexico’s regulations do not explicitly allow corporate self-guarantees, but forms of cash, surety bonds and third-party guarantees are allowed. Phelps Dodge has proposed the latter form of assurance for each of the three mines.

Because Phelps Dodge owns the mines as shell companies, it is attempting to serve as the “third party” for each mine. Therefore, in this case, the third-party guarantee essentially would be a self-guarantee—a promise made by the controlling mining company. It would provide no real financial assurance at all. Public interest groups in the state are contesting the Phelps Dodge proposal and encouraging the state to require the full amount of financial assurance necessary in a suitable form, such as a combination of cash equivalents (cash, certificates of deposit, water rights and other real property).

C. BUREAU OF LAND MANAGEMENT – 3809 MINING REGULATIONS

The Bureau of Land Management’s (BLM) 3809 surface mining rule (43 CFR 3809) regulates mining operations on Department of Interior lands except national parks and other protected lands. As originally approved in 1980, the “3809 Rules” did not adequately define reclamation and closure or require financial assurance. The 1980 rule was still in effect in 2000 when *Hardrock Reclamation Bonding Practices in the Western United States* estimated the taxpayers’ potential liability for cleanup costs at then-operating mines at \$1 billion. It is the inadequacies of the 1980 rule and many other state reclamation regulations, together with recent experience, that are largely responsible for that estimate increasing from a minimum of \$1 billion to a maximum of approximately \$12 billion in three years.

In October 2000, the Clinton administration enacted new and significantly improved 3809 mining rules. The Clinton rules better protected the environment in general—and surface water and groundwater resources in particular—by defining standards for mine operation, reclamation and closure. It also significantly improved federal financial assurance by:

- requiring approved financial assurance as a precondition for mining;
- eliminating new corporate self-guarantees;
- authorizing the establishment of trust funds to address long-term water treatment costs; and
- codifying authorization of incremental financial assurance release.

These reforms were short-lived. In October of 2001, the Bush administration rolled back almost the entire rule, including those parts defining reclamation and closure. Kept were those parts dealing with financial assurance. In an October 25, 2001, letter to Congress justifying the rollback, Interior Secretary Gale Norton explained her support for retaining the stronger financial assurance language, calling for “[s]tringent financial guarantee requirements—the so-called bonding provisions—that will ensure that the full costs of any mine reclamation or environmental damage are borne by the mining operator, and not the U.S. taxpayer.”

Although the financial assurance section of the rule was kept verbatim, it still was weakened when the Bush administration rolled back the 3809 mining rule reforms. Financial assurance for mine reclamation is only as strong as the definition of mine reclamation. The Bush administration essentially eliminated the definition of mine reclamation—leaving the estimator of the financial assurance (usually the mining company) to define it on a site-by-site basis.

To date, the BLM has failed to respond to the new financial assurance regulations. In most areas they have not been enforced—a trend no doubt influenced by uncertainty over the regulations’ ultimate fate.

THE POLITICAL CONTEXT

In April 2002, Secretary Norton created a special internal Interior Department task force to address the issue of whether government or regulatory action is needed to address the issues related to the cost and availability of surety bonds for mine reclamation.

The supposed case for weakening financial assurance regulations relies largely upon the scarcity of surety bonds under existing regulations. At a July 2002 hearing of the House Resources Energy and Minerals Subcommittee, two hardrock mining companies, Glamis Gold Ltd. of the U.S. and Rio Tinto-Kennecott of Britain, requested that mining regulations be weakened and corporate self-guarantees be legalized.²⁵ Additionally, in comments to BLM, Newmont Mining Company requested that corporate self-guarantees be reauthorized to alleviate the surety bonding “crisis.”²⁵

However, at the same time, these companies and many others have responded to the surety bonding market correction and solved the “crisis” without the federal government’s intervention or other special considerations. Glamis and Rio Tinto have joined two of the largest gold mining companies in the U.S., Placer Dome and Barrick, as well as smaller companies like Stillwater Mining Company, to secure and retain their existing surety bonds. Otherwise, they have been able to provide cash equivalents such as letters of credit, treasury bonds or other suitable forms of financial assurance under existing rules.



VI. Conclusions and Recommendations

Experiences at recently closed mines demonstrate the significant underfunding of existing financial assurance at most of today's major mines. Mining companies' own estimates serve as the basis for financial assurance at many of these mines, and these estimates have proven to be 50 percent to 10,000 percent lower than the actual price tag for reclamation. The mining industry and responsible regulatory agencies regularly fail to accurately estimate reclamation costs, potential for acid drainage generation, long-term treatment needs and the effects of pollutants such as cyanide, mercury and selenium that present expensive and potentially long-term reclamation issues.

The relative scarcity of surety bonds for mining operations is merely a consequence of historically underestimating risk for many modern large-scale mines. This problem could have severe effects on the environment, as well as state and federal budgets.

Corporate responsibility scandals involving companies like Enron and WorldCom, along with the bankruptcy of Kmart and other large corporate entities previously considered solid, have rocked public confidence in corporations and demonstrated a need for much greater corporate accountability, transparency and fair dealing. Today at hardrock mines throughout the western U.S., under both state and federal jurisdiction, there is a growing bonding or liability gap. The recent example of ASARCO providing approximately one-tenth of the necessary funds for environmental remediation at its mines could become the norm unless something is actively done.²⁶ Perhaps the realization of more than \$1 billion in taxpayer costs for ASARCO alone will finally wake up those responsible for regulating mining companies. The un-bonded cleanup liability at today's mines ranges from \$1 billion to \$12 billion.

When the insurance industry turned its newly skeptical eye to the hardrock mine bond market, it was confronted with evidence that potential surety bond investments are expensive, long-term and risky. Consequently, during 2002 the insurance industry made a market correction, shrinking the surety bond market significantly. Surety companies have since notified many mines in the U.S. that they will no longer write new bonds for mines, and in some cases that they will cancel existing bonds.

However, surety bonds are just one form of financial assurance available to help mining companies protect taxpayers from paying for mine reclamation and closure. Adequate alternatives, such as letters of credit, are available under existing regulations. Cash equivalent alternatives are also available. Alternatives are more expensive than surety bonds, but not prohibitively so in most cases. Due to the recognized increase in the real costs associated with mine closure and reclamation, this greater expense must be seen as a cost of doing business. When mining industry representatives testified before Congress in July 2002, every industry representative indicated that they are able to secure some form of financial assurance that satisfies existing regulations.²⁷

Interestingly, the industry-funded Mining, Minerals and Sustainable Development (MMSD) research program issued a report recognizing that financial guarantees are necessary to ensure that companies will comply with reclamation and closure plans.²⁸ By requiring real financial guarantees, the specific obligations for mine closure will be carried out, costs will be internalized by companies and economic efficiency will be promoted. The MMSD report concludes that "...without such surety, the legacy of abandoned sites and their attendant problems are certain to grow." Final recommendations included enhancing efforts to address the legacy of past mining and mineral activities, and strengthening legislated rules, market incentives, and voluntary programs to prevent the problem from continuing into the future. A key feature of the recommendations was adherence to the principle that the "polluter pays" all costs for reclamation and closure.

To address the multibillion-dollar potential taxpayer liability for mine cleanup, additional steps are necessary, including strengthening existing regulations. Existing regulations should be enforced and in some instances amended to provide better guidance to those responsible for estimating reclamation costs. State and federal regulatory agencies should require new site assessments, revisions to reclamation and closure plans, and corresponding revisions in financial assurance. Existing regulations should be amended to include full public disclosure and limit industry influence in the cost-estimation process.

Additionally, elected officials and regulators should focus their efforts on preventing any weakening of regulations or enforcement. Otherwise, clean water and other natural resources will only be further jeopardized, which could lead to growing liabilities for state and federal governments. The net effect could be a series of mine messes with staggering cleanup costs for taxpayers. This is not a wise course of action at any time, but it is particularly unwise during a time of tight state and federal budgets.

RECOMMENDATION: *Do no harm. Do not weaken existing financial assurance regulations to legalize or reauthorize corporate self-guarantees or otherwise weaken existing financial assurance rules and regulations.*

Weakening existing financial assurance requirements would only benefit the less responsible mining companies. If the federal government weakens regulations, the financial responsibility for mining reclamation and closure costs will shift even more from a heavily subsidized industry to tax-

payers. Since the currently standing federal law on mining was passed in 1872, the mining industry has received massive subsidies from the U.S. government. These include giveaways of approximately \$1 billion in royalty-free publicly owned minerals per year, in some instances the unlimited use of publicly owned lands for mine waste dumping, and other subsidies that cost taxpayers an additional \$260 million per year.^{29, 30}

RECOMMENDATION: *Address the surety industry’s concerns by taking advantage of existing regulatory flexibility.*

According to the surety industry trade association’s testimony to Congress, three factors are key to reduced investment in reclamation bonding.³¹ There is no need to weaken federal regulations to address the surety industry’s concerns. The Bureau of Land Management’s existing 3809 surface mining regulations address each of these issues:

- 1. Bonds of long or uncertain term.** Sections 3809.553 and 3809.590 combine to authorize concurrent reclamation (“clean as you go”), a practice that reduces bond term length by completing reclamation (and bond release) in increments as a mining operation proceeds. Unfortunately, concurrent reclamation, by mining industry choice, is the exception to common practice. Under existing regulations, surety companies could require mining companies to practice concurrent reclamation as a condition for issuing reclamation bonds. Besides reducing environmental liability, concurrent reclamation also provides immediate environmental benefits by mitigating pollution while the mine operates, rather than waiting for mine closure.
- 2. Bonds with obligations that expand beyond initial agreements.** Section 3809.552(c) authorizes the BLM to require separate financial assurance for uncertain and/or long-term reclamation requirements such as acid mine drainage. By allowing BLM to require a trust fund for long-term, post-mine closure reclamation requirements, reclamation costs can be divided into two categories: more certain (therefore bondable), and less certain (therefore covered by a trust fund).
- 3. Limited choices for remedying default.** As an alternative to bond forfeiture, section 3809.596(d)(2) allows “a surety to complete the reclamation, or the portion of the reclamation applicable to the bonded phase or increment, if the surety can demonstrate an ability to complete the reclamation in accordance with the reclamation measure incorporated in [the] approved plan of operations.” In other words, a surety company issuing a bond can complete reclamation and closure in lieu of paying BLM the bond amount, if the surety company demonstrates to BLM’s satisfaction that it can do so.

RECOMMENDATION: *Regulatory agencies should require new site assessments, revisions to reclamation and closure plans, and both a revision of and increase to financial assurances.*

In the immediate term, the easiest way to address the financial assurance crisis is to benefit from recent experience in Montana and New Mexico. Actual reclamation costs have been shown to exceed guaranteed amounts by more than 100 times in some instances. Regulators should not wait for problems or disasters to occur; rather they should revise reclamation and closure plans and financial assurance amounts now. Regulators should also put in place mandatory annual financial assurance reviews. Whenever monitoring data, field investigations or other information indicate an increase in reclamation and closure costs, regulators should be required to increase financial assurances accordingly. All reviews should be done in a timely manner with full public disclosure and review.

RECOMMENDATION: *Strengthen existing regulations to explicitly define and account for indirect costs associated with reclamation after operator default.*

Indirect costs, such as administrative overhead and contractor profit, commonly cost an additional 40 percent to 60 percent of direct costs on top of monies spent on direct costs (i.e. costs spent directly on mine reclamation). However, regulators consistently underestimate indirect costs at 0 percent to 45 percent of direct costs. For example, at a mine where direct reclamation costs \$100 million, indirect costs are actually 50 percent (\$50 million) but the regulator estimates them at 32 percent (\$32 million), making taxpayers potentially liable for the difference (\$18 million). Unfortunately, the direct cost of reclamation is often underestimated, which also increases taxpayer exposure.

RECOMMENDATION: *Strengthen existing regulations to eliminate industry influence from the reclamation cost-estimation process by requiring independent third-party estimates of financial assurance.*

Current regulation allows the industry, or a contractor hired by a mining company, to estimate the amount of financial assurance at existing, new or proposed mines. Companies, in order to be responsible corporate actors, should take action to assure full funding for reclamation. However, the only way to make certain that such standards apply to all mining on our public lands is a government requirement or mandate for secure financial assurance that reflects true costs as a precondition for mining. State and federal agencies or truly independent third parties must be responsible for determining and setting financial assurance amounts. This process must be subject to full public disclosure and review, as taxpayers bear the costs of failed financial assurance.

RECOMMENDATION: *Provide better guidance to those responsible for setting financial assurance amounts by establishing meaningful reclamation definitions and standards.*

In setting financial assurance amounts, regulatory agencies must have a clear definition of reclamation. The following provisions should be included as requirements for all reclamation and closure plans, and specific performance standards should 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
- visual and other aesthetic impacts.

Many of these and other recommendations were made in 2000, before current conditions developed.³² If those recommendations had been followed at the time they were made, it is quite likely the mining industry would not be facing its current lack of financial assurance. The issue of mine reclamation financial assurance is not complex from the public's perspective: polluters must concretely and reliably guarantee that they—not taxpayers—will pay for the environmental damages caused by their businesses.



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Endnotes

¹ EPA, 2000.

² EPA, 2002.

³ “Modern mines” is defined as mines opened or operated in the mid 70’s and onward.

⁴ MDEQ financial assurance determination files.

⁵ NMED, 2002a; NMED 2002b

⁶ Schubert, 2002.

⁷ Ibid.

⁸ CFR 3809.

⁹ (need reference)

¹⁰ In December 2000, the U.S. Department of Justice reached a settlement with Robert Friedland, former President of Galactic Resources, calling for him to pay the Federal government and the State of Colorado \$27,750,000.

¹¹ EPA, 2002

¹² Kuipers, 2000.

¹³ Byron, 2003.

¹⁴ Kennecott, 2002.

¹⁵ MDEQ, 2001.

¹⁶ Based on various guidance from Office of Surface Mining, Montana Department of Environmental Quality, New Mexico Mining and Minerals Division Dept. of Natural Resources and cost estimates used by these agencies in actual financial assurance cost estimates.

¹⁷ Based on Means Heavy Construction Cost Escalation Data, 2002.

¹⁸ Information provide by Dave Gaskin of the Nevada Department of Environmental Protection (NDEP) at a meeting on financial assurance in Reno on July 12, 2002.

¹⁹ Memo on Nevada BLM bankruptcies as of July 15, 2000.

²⁰ Based on MDEQ financial assurance estimates.

²¹ MMD, 2002.

²² NMED, 2002a.

²³ NMED, 2002b

²⁴ Done, 2002; Jeannes, 2002

²⁵ Comments of Newmont Mining Corporation to BLM re Proposed Rule 43 CFR Part 3800, April 12, 2002.

²⁶ Byron, 2003.

²⁷ Done, 2002; Jeannes, 2002

²⁸ MMSD, 2002.

²⁹ Bureau of Land Management FY2001 Annual Report.

³⁰ FY2003 Bush Budget Proposal, Analytic Perspectives, no. 21-22, page 99.

³¹ Schubert, 2002.

³² Kuipers, 2000.



Appendix

Based on information from *Hardrock Reclamation Bonding Practices in the Western United States* and updated information, **TABLE 2: Existing Financial Assurance for Hardrock Mine Reclamation by Mine**, was created (see page 47). The table contains the following information:

- mine name and state of location;
- mine ownership;
- commodity extracted;
- disturbed area (either actual or projected) in acres;
- existing total financial assurance amount; and
- amount of financial assurance on a dollar per disturbed acre basis.

Information on mine names, state, ownership and commodity are current as of February 2000. Information on disturbed acres and existing financial assurance was taken directly from reclamation plans and financial assurances and other information obtained from the agencies during the period 1998 to 2000, with the New Mexico and Montana information updated for 2002. In most other cases the information has not significantly changed.

The mines listed all have existing financial assurance of \$250,000 or greater (mines with less than \$250,000 in financial assurance are excluded from the list). The disturbed area may be actual or projected acres, with the financial assurance amount corresponding to the indicated acreage.

A total of 150 mines are listed in the table. The total disturbed area is 271,544 acres with a range of two acres to 27,090 acres (as in the case of Kennecott's Bingham Canyon Mine and associated facilities), averaging approximately 1,800 acres per mine. The existing financial assurance for the mines totals \$1.4 billion. The largest financial assurance is at the Questa Mine in New Mexico (\$156 million), with an average financial assurance of \$9.3 million per mine.

The financial assurance on a dollar-per-acre-disturbed basis is useful for comparison of the various financial assurance amounts. It shows that the amount per acre varies significantly for each

mine site, ranging from less than \$100 per acre to \$400,000 per acre. The variance is primarily due to differences in state or federal requirements and site characteristics. For example, the smallest amounts of financial assurance on a per acre basis are required for mines in Arizona, reflecting both the state’s lack of specific reclamation requirements and the fact that groundwater quality and other post-mining impacts are largely ignored in the determination of financial assurance. On the other hand, the highest values per acre are for relatively small sites (generally less than 10 acres) where remaining activities may be high-cost (such as facilities removal).

The most notable group of mines on a dollar-per-acre basis involves those where acid drainage has been recognized and necessary mitigation measures, such as long-term water treatment, have been included in the financial assurance amount. Examples where this is the case include the following:

TABLE 3: Existing Financial Assurances for Representative Acid Generating Mines

Mine	State	Disturbed Area, Acres	Existing Financial Assurance, Total	Existing Financial Assurance, \$/acre
Basin Creek	Montana	296	\$6,276,100	\$21,203
Golden Sunlight	Montana	2,967	\$64,089,000	\$21,601
Richmond Hill	South Dakota	321	\$10,700,000	\$33,333
Gilt Edge	South Dakota	263	\$12,850,000	\$48,859
Questa Mine	New Mexico	3,000	\$156,000,000	\$52,000
Zortman and Landusky	Montana	1,215	\$70,510,000	\$58,033
Greens Creek	Alaska	300	\$23,000,000	\$76,667
Mineral Hill	Montana	106	\$8,732,600	\$82,383

The costs associated with acid drainage range from approximately \$21,000 to \$82,000 per acre. These costs may be conservative, as agencies have determined that an additional \$33 million is necessary to complete reclamation and closure of the Zortman-Landusky mines, increasing the reclamation costs at those sites to approximately \$85,000 per acre. There are indications of similarly higher costs for the Gilt Edge mine in South Dakota. The above mines are all either gold or molybdenum mines located in relatively pro-active states or situations. Numerous other mine sites with acid drainage issues are likely to be identified if investigation is undertaken.

For example, other mines with undetermined acid drainage problems in 2000 have come to light in the past few years. Most significantly, the Chino and Tyrone Mines in New Mexico have been recently evaluated, and significant acid drainage occurs at both sites, resulting in an agreed-upon amount for the Chino Mine of approximately \$42,500 per acre (based on \$391 million total financial assurance) and a likely amount for the Tyrone Mine of \$55,000 to \$73,000 per acre (based on from \$330 million to \$440 million total financial assurance). It should be noted that these are the

first copper mines where significant acid drainage has been recognized and mitigations assumed. If these circumstances and costs are typical for copper mines, as is indicated, significant shortfalls are likely in financial assurance for copper and other base metal mines, such as those for lead and zinc. This could be a problem equal to the shortfall already recognized in terms of acid drainage associated with precious metals and molybdenum mines.

Trying to project a potential shortfall in financial assurance for each mine, much less on an industry-wide basis, is an extremely difficult task. However, if certain assumptions are made, the potential shortfall can at least be determined, providing a credible basis for an estimate of liability.

Based on experience with reclamation planning and financial assurance cost estimation the minimum and maximum liability has been estimated for each state and is presented in the Executive Summary and as **TABLE 4: Estimated Hardrock Mine Reclamation Financial Assurance Liability by State**. The basis for the estimate is provided in the following sections along with a brief summary of each state’s hardrock mine reclamation and financial assurance liabilities.

TABLE 4: Estimated Hardrock Mine Reclamation Financial Assurance Liability by State

State	Disturbed Acres	Existing Financial Assurance	Existing Financial Assurance,	Estimated Minimum Shortfall, %	Estimated Minimum Liability	Estimated Maximum, \$/acre	Estimated Maximum Liability
Alaska	3,561	\$37,462,910	\$10,520	50%	\$18,731,455	\$50,000	\$140,587,090
Arizona	78,837	\$146,456,779	\$1,858	50%	\$73,228,390	\$50,000	\$3,795,393,221
California	6,286	\$30,983,770	\$4,929	50%	\$15,491,885	\$50,000	\$283,316,230
Colorado	10,971	\$97,594,745	\$8,896	50%	\$48,797,373	\$50,000	\$450,955,255
Idaho	5,790	\$40,110,236	\$6,928	50%	\$20,055,118	\$50,000	\$249,389,764
Montana	13,524	\$213,794,400	\$15,809	50%	\$106,897,200	\$50,000	\$462,405,600
Nevada	100,410	\$475,548,642	\$4,736	50%	\$237,774,321	\$50,000	\$4,544,951,358
New Mexico	18,985	\$275,137,000	\$14,492	50%	\$137,568,500	\$50,000	\$674,113,000
South Dakota	2,186	\$30,949,000	\$14,158	50%	\$15,474,500	\$50,000	\$78,351,000
Utah	30,915	\$50,898,471	\$1,646	50%	\$25,449,236	\$50,000	\$1,494,851,529
Washington	79	\$3,346,451	\$42,360	50%	\$1,673,226	\$50,000	\$603,549
Total	271,544	\$1,402,282,404	\$5,164		\$701,141,202		\$12,174,917,596

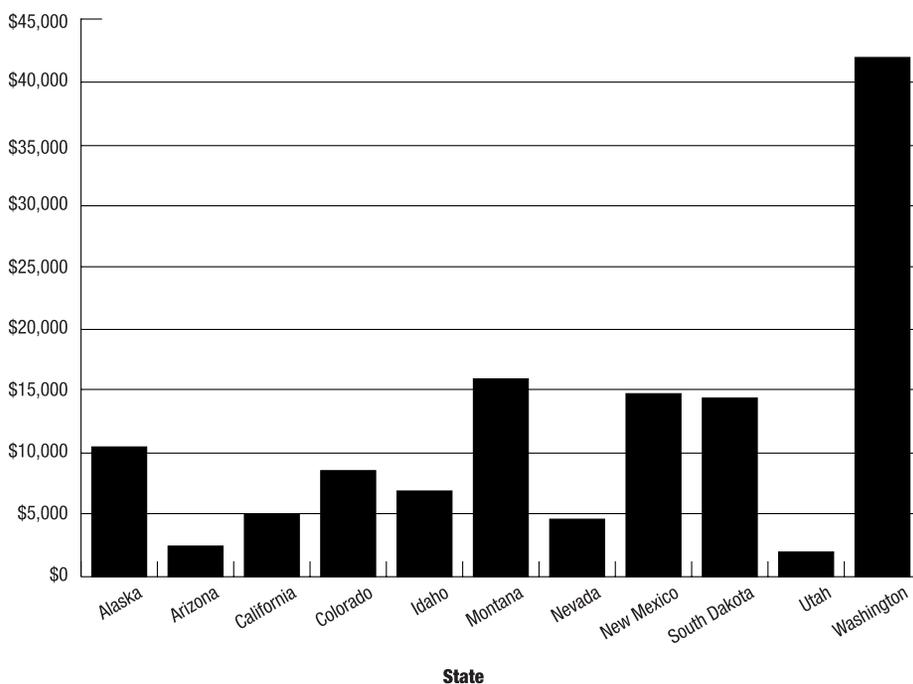
DISTURBED ACRES AND EXISTING FINANCIAL ASSURANCE

Hardrock mines in the western U.S. that have financial assurance estimates of \$250,000 or greater per mine disturb approximately 272,000 acres in total.¹ The existing amount of financial assurance held by state and federal agencies for reclamation and closure of those mines totals approximately \$1.4 billion. Nevada and Arizona together account for 66 percent of the total disturbed acreage but only 44 percent of the total financial assurance.

FINANCIAL ASSURANCE PER ACRE DISTURBED

One way to view the relative amount of financial assurance required by each state is to evaluate the average amount of financial assurance per disturbed acre, as contained in Table 3. The same data is depicted in Figure 1. Utah and Arizona, at \$1,646 per acre and \$1,858 per acre respectively, have the lowest average financial assurance amounts. They are followed by Nevada and California at \$4,736 per acre and \$4,929 per acre respectively. This compares to Washington with more than \$40,000 per acre and Montana, New Mexico and South Dakota, all of which range from approximately \$14,000 to \$16,000 per acre.

Figure 2: Existing Financial Assurance Amounts in \$/acre by State



ESTIMATED MINIMUM SHORTFALL AND LIABILITY

On average, the cost of reclamation by governmental agencies is underestimated by 50 percent. This is due to insufficient indirect cost estimates, including those for engineering and agency administration, as well as underestimation of actual unit costs. While there are some financial assurance estimates without shortfalls, an equal or greater number have significant shortfalls of 100 percent or more. Examination of each state's present circumstances, as contained in the following discussion, shows that they each still have significant and potentially ominous issues that support an estimated minimum liability of at least 50 percent, so on a conservative basis 50 percent of the existing financial assurance amount was used to estimate each state's minimum liability.

On this basis, the total estimated minimum liability can be estimated at \$700,000,000 as shown on Table 3. However, considering that many of these mines, particularly those in Arizona and Nevada, have self-guaranteed financial assurance, the minimum potential liability can be reasonably stated as \$1 billion.

ESTIMATED MAXIMUM COST AND LIABILITY

The range of costs associated with acid drainage mitigation ranges from approximately \$20,000 per acre to \$80,000 per acre, with a median of approximately \$50,000 per acre, at the mine sites listed in Table 2. If all U.S. hardrock mines sites are determined to have acid drainage issues requiring source controls and water treatment typical of existing reclamation and closure plans, the potential liability for acid drainage, depending on the per acre cost, would be as follows:

\$20,000/acre cost equals \$3.8 billion liability

\$50,000/acre cost equals \$12.2 billion liability

\$80,000/acre cost equals \$20.4 billion liability

While it is doubtful that all mines will have acid drainage or other characteristics that require additional remediation to meet state and federal requirements, it is highly likely that from 50 percent to 75 percent or more of all hardrock mines will require significant additional remediation beyond what is presently anticipated in existing reclamation plans and financial assurance estimates. Therefore, using \$50,000 per acre to estimate the maximum liability is reasonable. This results in an estimated maximum liability for all hardrock mines in the western U.S. of approximately \$12.2 billion. Therefore, the range of liability for shortfalls in existing financial assurance for hardrock mine reclamation and closure in the western U.S. is estimated at \$1 billion to \$12 billion dollars.



State-by-State Analysis of Data

ALASKA

Alaska has a total of four major mines that disturb 3,561 acres, for which the state has an existing financial assurance amount of approximately \$37 million for an average of \$10,520 per acre. However, three of the four mines have existing financial assurance of less than \$5,000 per acre, whereas one mine (Greens Creek) has an existing financial assurance of almost \$77,000 per acre. It should be noted that acid drainage has been identified and at least partially mitigated in the Greens Creek reclamation plan and is reflected in the financial assurance amount.

Alaska currently does not account for approximately half of the indirect costs and does not closely examine the unit costs proposed by the mine operators, who prepare the financial assurance estimates, justifying a minimum shortfall of 50 percent and resulting in minimum estimated liability of approximately \$19 million. Alaska has yet to adequately address the issue of acid drainage and other additional remedial costs at its mines. The Red Dog mine in particular is known to have significant acid drainage issues that have not been addressed, and the long-term costs of mitigating the Greens Creek mine have not been determined and are not included in the existing financial assurance. Therefore, the estimated maximum liability of \$141 million could be significantly less than what is actually necessary in the event mining companies fail to fulfill their reclamation liabilities in Alaska.

ARIZONA

Arizona has a total of 15 major mines that disturb 78,837 acres, for which the state has an existing financial assurance amount of approximately \$146 million for an average of \$1,858 per acre, the second lowest of all the western states.

Arizona's major mines are all copper mines. They are regulated by the state in a manner that delays the actual determination of final reclamation plans and therefore financial assurance amounts until the mines reach closure. As a result, the existing reclamation plans and financial assurance estimates are limited to marginal surface reclamation measures and except in very limited cases have not evaluated impacts to groundwater and surface water, or to mitigations and costs

related to those impacts. As a result, the estimated minimum shortfall of 50 percent, leading to an estimated minimum liability of \$73 million—combined with the fact that most of the amount is in the form of corporate self-guarantees—probably is severely underestimated. Given the recent revelations in New Mexico from assessments of copper mines in that state with similar characteristics, the estimated maximum liability of \$3.8 billion based on \$50,000 per acre is not only plausible, but may represent the most likely outcome as Arizona’s copper mines are closed or abandoned by companies like ASARCO.

CALIFORNIA

California has a total of 12 major mines that disturb 6,286 acres, for which the state has an existing financial assurance amount of approximately \$31 million for an average of \$4,929 per acre. The only mine in California identified as acid drainage generating is the McLaughlin mine, with an average reclamation and closure amount of \$15,229. This does not include post-reclamation mitigation costs.

California currently does not account for approximately half of the indirect costs and does not closely examine the unit costs proposed by mine operators, who prepare the financial assurance estimates, justifying a minimum shortfall of 50 percent and resulting in minimum estimated liability of approximately \$15 million. California has yet to adequately address the issue of acid drainage and other additional remedial costs at its mines. The McLaughlin mine was not originally predicted to be acid-generating, however it is highly probable that as it and other mines in the state reach closure, they will be determined to have significant acid drainage and other issues requiring action. Therefore, the estimated maximum liability of \$283 million could be significantly less than actually necessary if mining companies fail to fulfill their reclamation liabilities in California.

COLORADO

Colorado has a total of seven major mines that disturb 10,971 acres, for which the state has an existing financial assurance amount of approximately \$98 million for an average of \$8,896 per acre. Many of Colorado’s mines are acid-generating, but their existing reclamation plans and financial assurance amounts do not include adequate reclamation and post-reclamation mitigation costs.

Colorado currently does not account for approximately half of the indirect costs and does not closely examine the unit costs proposed by mine operators, who prepare the financial assurance estimates, justifying a minimum shortfall of 50 percent and resulting in a minimum estimated liability of approximately \$49 million. Colorado has yet to adequately address the issue of acid drainage and other additional remedial costs at its mines. One of the primary factors is the existence of regulations that allow mining companies to avoid addressing closure costs by staying in standby mode and operating for a few months every five years. It is highly probable that as mines

in the state reach closure they will be determined to have significant acid drainage and other issues requiring action. Therefore, the estimated maximum liability of \$451 million could be significantly less than what is actually necessary if mining companies fail to fulfill their reclamation liabilities in Colorado.

IDAHO

Idaho has a total of seven major mines that disturb 5,790 acres, for which the state has an existing financial assurance amount of approximately \$40 million for an average of \$6,928 per acre. Many of Idaho's mines are acid-generating, but their existing reclamation plans and financial assurance amounts do not include adequate reclamation and post-reclamation mitigation costs.

Idaho currently does not account for approximately half of the indirect costs and does not closely examine the unit costs proposed by mine operators, who prepare the financial assurance estimates, justifying a minimum shortfall of 50 percent and resulting in minimum estimated liability of approximately \$20 million. Idaho has yet to adequately address the issue of acid drainage and other additional remedial costs at its mines. It is highly probable that as additional mines in the state reach closure, they will be determined to have significant acid drainage and other issues requiring action. Therefore, the estimated maximum liability of \$249 million could be significantly less than what is actually necessary if mining companies fail to fulfill their reclamation liabilities in Idaho.

MONTANA

Montana has a total of 13 major mines that disturb 13,524 acres, for which the state has an existing financial assurance amount of approximately \$214 million for an average of \$15,809 per acre. During the past five years, Montana has determined that nearly all of its hardrock mines are acid-generating or have other impacts that require additional reclamation and long-term mitigations. In fact, the state has estimated that 10 of the 13 mines in the state will require some form of water treatment for 30 years to more than 1000 years (essentially "in perpetuity" in many cases). While many have been revised, not all of the existing reclamation plans and financial assurance amounts include adequate reclamation and post-reclamation mitigation costs.

Montana currently does not account for approximately one-quarter of the indirect costs that it may incur. However, Montana is plagued by limitations on financial assurance amounts that have been "grandfathered" for lands disturbed during the early period of the state's reclamation laws. While these provisions pertain to only one mine, this leads to significant shortfalls justifying a minimum shortfall of 50 percent and resulting in minimum estimated liability of approximately \$107 million. Montana has only recently begun to adequately address the issue of acid drainage and other additional remedial costs at its mines, as evidenced by existing shortfalls at the Zortman-Landusky and Beal mines of at least \$40 million. While the state has revised most of the remaining existing plans and financial assurance amounts, failure to address the Continental mine

owned by Montana Resources and ASARCO has left the state open to huge additional liabilities. Therefore, the estimated maximum liability of \$462 million is reasonable in the event mining companies fail to fulfill their reclamation liabilities in Montana.

NEVADA

Nevada has a total of 72 major mines that disturb 100,410 acres, for which the state has an existing financial assurance amount of approximately \$476 million for an average of \$4,736 per acre.

Nearly all of Nevada's major mines are gold mines regulated by the state in a manner that assumes from an absence of data that acid drainage will not be a significant issue at any of the state's mines. As a result, existing reclamation plans and financial assurance estimates are limited to primarily surface reclamation measures and except in very limited cases have not evaluated impacts to groundwater and surface water, or mitigations and costs related to those impacts. As a result, the estimated minimum shortfall of 50 percent, leading to an estimated minimum liability of \$238 million—combined with the fact most of that amount is in the form of corporate self-guarantees—probably is severely underestimated. Given the recent revelations about acid drainage potential and costs in other states, the estimated maximum liability of \$4.5 billion based on \$50,000 per acre is plausible.

NEW MEXICO

New Mexico has a total of seven major mines that disturb 18,985 acres, for which the state has an existing financial assurance amount of approximately \$275 million for an average of \$14,492 per acre. During the past five years, New Mexico has determined that nearly all of its hardrock mines are acid-generating or have other impacts that will require additional reclamation and long-term mitigations. That determination has resulted in an increase at the Questa Mine to \$52,000 per acre in estimated reclamation and closure costs. New Mexico currently is requiring similar increases at the Phelps Dodge Chino, Tyrone and Continental mines, but these were not completed prior to the completion of this report.

New Mexico currently accounts for up to 90 percent of the indirect costs that it may incur. However, New Mexico is considering the possibility of allowing corporate self-guarantees at some of its largest mines, which could lead to significant problems, justifying a minimum shortfall of 50 percent and resulting in a minimum estimated liability of approximately \$138 million. New Mexico has only recently begun to adequately address the issue of acid drainage and other additional remedial costs at its mines, and is in the process of revising the plans and financial assurance amounts for Phelps Dodge's Chino, Tyrone and Continental mines. Therefore, the estimated maximum liability of \$674 million is reasonable in the event mining companies fail to fulfill their reclamation liabilities in New Mexico. If New Mexico were able to obtain the proposed financial assurance amounts for the Chino, Tyrone and Continental mines in a suitable form (other than corporate self-guarantee), the state could eliminate most of its potential liabilities.

SOUTH DAKOTA

South Dakota has a total of five major mines that disturb 2,186 acres, for which the state has an existing financial assurance amount of approximately \$31 million for an average of \$14,158 per acre. Many of South Dakota's mines are acid-generating, and at least to some extent their existing reclamation plans and financial assurance amounts include reclamation and post-reclamation mitigation costs. However, in at least some cases those costs have been underestimated.

South Dakota currently does not account for approximately half of the indirect costs and does not closely examine the unit costs proposed by mine operators, who prepare the financial assurance estimates, justifying a minimum shortfall of 50 percent and resulting in minimum estimated liability of approximately \$15 million. South Dakota has yet to adequately address the issue of acid drainage and other additional remedial costs at its mines. It is highly probable that as additional mines in the state reach closure, they will be determined to have significant acid drainage and other issues requiring action. Therefore, the estimated maximum liability of \$78 million could be significantly less than what is actually necessary in the event mining companies fail to fulfill their reclamation liabilities in South Dakota.

UTAH

Utah has a total of seven major mines that disturb 30,915 acres, for which the state has an existing financial assurance amount of approximately \$51 million for an average of \$1,646 per acre, the lowest of all the western states. Utah provided an exemption from reclamation and closure requirements at the Bingham Canyon mine, severely undermining the state's ability to require adequate financial assurance.

Utah's existing reclamation plans and financial assurance estimates are limited to marginal surface reclamation measures and, except in very limited cases, have not evaluated impacts to groundwater and surface water or mitigations and costs related to those impacts. As a result, the estimated minimum shortfall of 50 percent, leading to an estimated minimum liability of \$25 million, probably is severely underestimated. Given the recent revelations in New Mexico and Montana based on assessments of copper and gold mines in those states, the estimated maximum liability of \$1.5 billion based on \$50,000 per acre is not only plausible, but may represent the most likely outcome if Utah requires mining operators to be responsible for the cleanup of their operations.

WASHINGTON

Washington has a total of two major mines that disturb 79 acres, for which the state has an existing financial assurance amount of approximately \$3 million for an average of \$42,360 per acre. Both of Washington's major mines are underground operations, and at least to some extent their existing reclamation plans and financial assurance amounts include reclamation and post-reclamation water treatment mitigation costs.

Washington currently does not account for approximately half of the indirect costs and does not closely examine the unit costs proposed by mine operators, who prepare the financial assurance estimates, justifying a minimum shortfall of 50 percent and resulting in minimum estimated liability of approximately \$2 million. Washington is unique in that its two mines already have been assessed an average of \$42,360 per acre, close to the \$50,000 per acre used to estimate maximum liability. Therefore, the estimated maximum liability for Washington is only \$600,000, or less than the minimum liability.

TABLE 2: Existing Financial Assurance for Hardrock Mine Reclamation by Mine
**(from *Hardrock Reclamation Bonding Practices in the Western United States*,
 Jim Kuipers 2000, with updates where available)**

Mine Name	State	Ownership	Commodity	Disturbed Area, Acres	Existing Financial Assurance, Total	Existing Financial Assurance, \$/acre
Fort Knox	Alaska	Fairbanks Gold Mining	Gold, Silver	1,528	\$6,834,451	\$4,473
Greens Creek	Alaska	Kennecott Greens Creek	Gold, Silver, Lead, Zinc	300	\$23,000,000	\$76,667
Illinois Creek	Alaska	Dakota Mining Corp.	Gold, Silver	386	\$1,618,209	\$4,192
Red Dog	Alaska	Cominco Alaska Inc.	Zinc, Lead, Silver	1,347	\$6,010,250	\$4,462
Ajo	Arizona	Phelps Dodge Ajo, Inc.	Copper	2,245	\$3,651,000	\$1,626
Bagdad	Arizona	Cyprus Bagdad Copper Corp.	Copper, Molybdenum	4,424	\$12,735,170	\$2,879
Carlotta	Arizona	Carlotta Copper Co.	Copper	255	\$336,118	\$1,318
Hayden	Arizona	ASARCO	Copper	3,754	\$2,528,476	\$674
Miami	Arizona	Cyprus Miami Mining Corp.	Copper	4,641	\$17,800,000	\$3,835
Miami	Arizona	BHP Copper, Inc.	Copper	442	\$5,035,298	\$11,392
Mineral Park	Arizona	Equatorial Mineral Park, Inc.	Copper	1,403	\$1,323,650	\$943
Mission	Arizona	ASARCO	Copper	8,358	\$2,988,441	\$358
Morenci	Arizona	Phelps Dodge Morenci, Inc.	Copper	18,968	\$14,254,000	\$751
Pinto Valley	Arizona	BHP Copper, Inc.	Copper	3,985	\$26,660,300	\$6,690
Ray	Arizona	ASARCO	Copper	9,157	\$784,826	\$86
San Manuel	Arizona	BHP Copper, Inc.	Copper	7,532	\$33,500,000	\$4,448
Sierrita	Arizona	Cyprus Sierrita Corp.	Copper	8,446	\$18,323,800	\$2,170
Silver Bell	Arizona	ASARCO	Copper	3,769	\$906,000	\$240
Twin Buttes	Arizona	Cyprus Sierrita Corp.	Copper	1,458	\$5,629,700	\$3,861
American Girl	California	MK & Hecla Mining Co.	Gold, Silver	155	\$278,750	\$1,798
Briggs	California	Canyon Resources Corp.	Gold, Silver	300	\$3,030,000	\$10,100
Cactus	California	Hecla Mining Co.	Gold, Silver	200	\$279,400	\$1,397
Castle Mountain	California	Viceroy Gold Corp.	Gold, Silver	685	\$1,605,000	\$2,343
Colosseum	California	Lac Minerals Ltd.	Gold, Silver	2	\$800,000	\$400,000
Hayden Hill	California	Amax Gold Inc.	Gold, Silver	1,021	\$5,714,566	\$5,597
McLaughlin	California	Homestake Mining Co.	Gold, Silver	803	\$12,228,964	\$15,229
Mesquite	California	Santa Fe Pacific Gold Corp.	Gold, Silver	1,995	\$3,048,081	\$1,528
Picacho	California	Glamis Gold Inc.	Gold, Silver	240	\$220,894	\$920

TABLE 2: continued

Mine Name	State	Ownership	Commodity	Disturbed Area, Acres	Existing Financial Assurance, Total	Existing Financial Assurance, \$/acre
Royal Mountain King	California	FMC Gold Co.	Gold, Silver	650	\$3,303,000	\$5,082
Soledad Canyon	California	P.W. Gillibrand Co.	Gold, Silver	30	\$259,600	\$8,653
Yellow Aster	California	Glamis Gold Inc.	Gold, Silver	205	\$215,515	\$1,051
Bulldog	Colorado	Homestake Mining Co.	Silver	60	\$268,500	\$4,475
Climax	Colorado	Cyprus Climax Metals Co.	Molybdenum	3,372	\$52,365,000	\$15,529
Cresson	Colorado	Cripple Creek and Victor Gold	Gold, Silver	2,544	\$25,244,845	\$9,923
Henderson	Colorado	Cyprus Climax Metals Co.	Molybdenum	4,138	\$10,133,000	\$2,449
Leadville Unit	Colorado	ASARCO inc.	Lead, Zinc, Gold, Silver	54	\$2,233,400	\$41,359
San Luis project	Colorado	Battle Mountain Gold Co.	Gold, Silver	560	\$6,100,000	\$10,893
Sunnyside	Colorado	Echo Bay Mines Ltd.	Silver, Copper, Lead, Zinc	243	\$1,250,000	\$5,144
Beartrack	Idaho	FMC Gold Co. (Meridian)	Gold, Silver	711	\$6,578,000	\$9,252
Black Pine	Idaho	Pegasus Gold	Gold, Silver	410	\$3,027,018	\$7,383
DeLamar	Idaho	Kinross DeLamar Mining Co.	Gold, Silver	1,072	\$10,743,570	\$10,022
Grouse Creek	Idaho	Hecla Mining Co.	Gold, Silver	524	\$7,038,945	\$13,433
Stibnite	Idaho	Dakota Mining Corp.	Gold, Silver	255	\$691,000	\$2,710
Stone Cabin	Idaho	Kinross DeLamar Mining Co.	Gold, Silver	718	\$726,000	\$1,011
Thompson Creek	Idaho	Thompson Creek Mining Co.	Molybdenum	2,100	\$11,305,703	\$5,384
Basin Creek	Montana	Pegasus Gold Co.	Gold, Silver	296	\$6,276,100	\$21,203
Beal Mountain	Montana	Pegasus Gold Co.	Gold, Silver	429	\$6,312,300	\$14,714
Continental	Montana	Montana Resources Int'l	Copper, Molybdenum	5,716	\$25,919,000	\$4,534
Diamond Hill	Montana	Pegasus Gold Co.	Gold, Silver	45	\$1,153,400	\$25,631
East Boulder	Montana	Stillwater Mining Co.	Platinum, Palladium	632	\$11,800,000	\$18,671
Golden Sunlight	Montana	Placer Dome	Gold, Silver	2,967	\$64,089,000	\$21,601
Kendall	Montana	Canyon Resources	Gold, Silver	538	\$1,869,000	\$3,474
Mineral Hill	Montana	TVX	Gold, Silver	106	\$8,732,600	\$82,383
Montana Tunnels	Montana	Pegasus Gold Co.	Gold, Lead, Zinc	1,143	\$15,590,000	\$13,640
Stillwater	Montana	Stillwater Mining Co.	Platinum, Palladium	255	\$7,800,000	\$30,588
Troy	Montana	ASARCO	Copper, Silver	592	\$10,800,000	\$18,024

TABLE 2: continued

Mine Name	State	Ownership	Commodity	Disturbed Area, Acres	Existing Financial Assurance, Total	Existing Financial Assurance, \$/acre
Zortman and Landusky	Montana	Pegasus Gold Co.	Gold, Silver	1,215	\$70,510,000	\$58,033
Alligator Ridge	Nevada	Placer Dome U.S.	Gold, Silver	593	2948987	\$4,973
Aurora	Nevada	Nevada Goldfields inc.	Gold, Silver	368	279478	\$759
Aurora	Nevada	Aurora Partnership	Gold, Silver	61	\$815,000	\$13,361
Bald Mountain	Nevada	Placer Dome U.S.	Gold, Silver	1,596	\$8,396,385	\$5,261
Battle Mountain	Nevada	Battle Mountain Gold Co.	Gold, Silver	3,966	\$6,756,127	\$1,704
Big Springs	Nevada	Independence Mining Co.	Gold, Silver	714	\$2,499,505	\$3,501
Blue Star	Nevada	Newmont Gold Co.	Gold, Silver	3,178	\$10,224,000	\$3,217
Bootstrap	Nevada	Newmont Gold Co.	Gold, Silver	1,271	\$9,196,000	\$7,235
Buckhorn	Nevada	Cominco American Resources Inc.	Gold, Silver	820	\$400,000	\$488
Bullfrog	Nevada	Barrick Bullfrog	Gold, Silver	1,430	\$3,195,895	\$2,235
Candelaria	Nevada	Kinross Candelaria Mining Co.	Gold, Silver	1,326	\$4,160,356	\$3,138
Carlin	Nevada	Newmont Gold Co.	Gold, Silver	1,526	\$10,050,000	\$6,586
Casino/Winrock	Nevada	Placer Dome U.S.	Gold, Silver	216	\$853,000	\$3,949
Coeur Rochester	Nevada	Couer Rochester Inc.	Gold, Silver	1,447	\$8,435,268	\$5,829
Copper Leach Project	Nevada	Cyprus Tonopah Mining Corp.	Copper	1,636	\$6,500,000	\$3,973
Cortez	Nevada	Placer Dome U.S.	Gold, Silver	730	\$2,460,546	\$3,371
County Line	Nevada	Arimetco International Inc.	Gold, Silver	115	\$210,000	\$1,826
Crescent Pit	Nevada	Placer Dome U.S.	Gold, Silver	219	\$617,489	\$2,820
Crofoot/Lewis	Nevada	Hycroft Resources and Development	Gold, Silver	2,061	\$5,100,837	\$2,475
Daisy	Nevada	Rayrock Mines Inc.	Gold, Silver	262	\$1,249,441	\$4,769
Dee	Nevada	Dee Gold Mining Co.	Gold, Silver	802	\$3,700,000	\$4,613
Denton Rawhide	Nevada	Kennecott Rawhide Mining Co.	Gold, Silver	1,369	\$5,191,500	\$3,792
Easy Junior	Nevada	Alta Gold Co.	Gold, Silver	208	\$365,517	\$1,757
Elder Creek	Nevada	Alta Gold Co.	Gold, Silver	102	\$256,062	\$2,510
Florida Canyon	Nevada	Florida Canyon Mining Co.	Gold, Silver	2,149	\$16,936,130	\$7,881
Fondaway Canyon	Nevada	Tenneco Minerals Co.	Gold, Silver	122	\$389,400	\$3,192
Getchell	Nevada	Getchell Gold Corp.	Gold, Silver	1,357	\$4,500,000	\$3,316

TABLE 2: continued

Mine Name	State	Ownership	Commodity	Disturbed Area, Acres	Existing Financial Assurance, Total	Existing Financial Assurance, \$/acre
Gold Acres	Nevada	Placer Dome U.S.	Gold, Silver	349	\$1,383,457	\$3,964
Gold Bar	Nevada	Atlas Gold Mining Co.	Gold, Silver	1,273	\$2,608,000	\$2,049
Gold Canyon	Nevada	Atlas Gold Mining Co.	Gold, Silver	58	\$453,000	\$7,810
Gold Quarry	Nevada	Newmont Gold Co.	Gold, Silver	8,004	\$61,000,000	\$7,621
Golden Butte	Nevada	Alta Gold Co.	Gold, Silver	89	\$328,942	\$3,696
Golden Eagle	Nevada	American Eagle Resources Inc.	Gold, Silver	100	\$581,389	\$5,814
Goldfield	Nevada	American Pacific Minerals Ltd.	Gold, Silver	210	\$841,161	\$4,006
Goldstrike	Nevada	Barrick Goldstrike Mines Inc.	Gold, Silver	5,955	\$35,029,800	\$5,882
Gooseberry	Nevada	Pallas Resources Corp.	Gold, Silver	85	\$269,195	\$3,167
Griffon	Nevada	Alta Gold Co.	Gold, Silver	161	\$756,927	\$4,701
Mooney Basin	Nevada	Placer Dome U.S.	Gold, Silver	9	\$2,672,196	\$296,911
Ivanhoe/Hollister	Nevada	Newmont Gold Co.	Gold, Silver	340	\$7,691,000	\$22,621
Jerritt Canyon	Nevada	Independence Mining Co.	Gold, Silver	3,411	\$7,153,932	\$2,097
Kinsley Mtn.	Nevada	Alta Gold Co.	Gold, Silver	309	\$857,193	\$2,774
Lone Tree	Nevada	Sante Fe Pacific Gold Corp.	Gold, Silver	2,691	\$8,375,000	\$3,112
Manhattan	Nevada	Round Mountain Gold Corp.	Gold, Silver	219	\$1,621,000	\$7,402
Marigold	Nevada	Marigold Mining Co.	Gold, Silver	1,084	\$3,495,000	\$3,224
McCoy/Cove	Nevada	Echo Bay Minerals Co.	Gold, Silver	4,348	\$21,996,600	\$5,059
Miekle	Nevada	Barrick Goldstrike Mines Inc.	Gold, Silver	114	\$8,000,000	\$70,175
Mineral Ridge	Nevada	Mineral Ridge Resources Inc.	Gold, Silver	420	\$1,640,086	\$3,905
Mt. Hamilton	Nevada	Mt. Hamilton Mining Co.	Gold, Silver	548	\$1,650,000	\$3,011
Mule Canyon	Nevada	Santa Fe Pacific Gold Corp.	Gold, Silver	2,931	\$22,200,000	\$7,574
North Area Leach	Nevada	Newmont Gold Co.	Gold, Silver	744	\$7,166,000	\$9,632
Northumberland	Nevada	Western States Minerals Corp.	Gold, Silver	285	\$1,100,000	\$3,860
Paradise Peak	Nevada	Arimetco International Inc.	Gold, Silver	899	\$1,157,000	\$1,287
Pinson	Nevada	Pinson Mining Co.	Gold, Silver	1,107	\$2,053,400	\$1,855
Pipeline	Nevada	Placer Dome U.S.	Gold, Silver	1,827	\$15,610,659	\$8,544
Preble	Nevada	Pinson Mining Co.	Gold, Silver	217	\$685,600	\$3,159
Post/Mill # 4	Nevada	Newmont Gold Co.	Gold, Silver	1,179	\$5,228,000	\$4,434

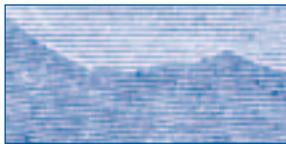
TABLE 2: continued

Mine Name	State	Ownership	Commodity	Disturbed Area, Acres	Existing Financial Assurance, Total	Existing Financial Assurance, \$/acre
Rain	Nevada	Newmont Gold Co.	Gold, Silver	935	\$9,882,500	\$10,570
Robinson	Nevada	BHP Minerals International	Copper, Gold	4,987	\$7,116,522	\$1,427
Rosebud	Nevada	Hecla Mining Co.	Gold, Silver	162	\$718,182	\$4,433
Round Mountain	Nevada	Round Mountain Gold Corp.	Gold, Silver	4,431	\$41,702,744	\$9,412
Ruby Hill	Nevada	Homestake Mining Co.	Gold, Silver	696	\$7,021,200	\$10,088
Santa Fe/Calvada	Nevada	Homestake Mining Co.	Gold, Silver	895	\$2,346,500	\$2,622
Sleeper	Nevada	AMAX Gold Inc.	Gold, Silver	1,650	\$7,837,200	\$4,750
Sterling JV	Nevada	Cathedral Gold U.S.	Gold, Silver	146	\$609,309	\$4,173
Toiyabe	Nevada	Inland Resources Inc.	Gold, Silver	81	\$547,400	\$6,758
Tonkin Springs	Nevada	Tonkin Springs Venture	Gold, Silver	537	\$1,300,000	\$2,421
Trenton Canyon	Nevada	Santa Fe Pacific Gold Corp.	Gold, Silver	2,325	\$13,900,000	\$5,978
Triplet Gulch/ Robertson	Nevada	Coral Resources Inc.	Gold, Silver	205	\$2,045,434	\$9,978
Twin Creeks	Nevada	Santa Fe Pacific Gold Corp.	Gold, Silver	13,447	\$35,596,352	\$2,647
Wind Mountain	Nevada	AMAX Gold Inc.	Gold, Silver	437	\$1,249,700	\$2,860
Yankee	Nevada	Placer Dome U.S.	Gold, Silver	356	\$3,439,139	\$9,661
Yerington	Nevada	Arimetco International Inc.	Copper	510	\$945,000	\$1,853
Chino	New Mexico	Phelps Dodge Corp.	Copper	9,200	\$60,000,000	\$6,522
Chino - Continental Pit	New Mexico	Phelps Dodge Corp.	Copper	400	\$1,787,000	\$4,468
Deming Mill	New Mexico	ASARCO Inc.	Lead, Zinc, Copper	10	\$850,000	\$85,000
Cunningham Hill	New Mexico	LAC Minerals	Gold, Silver	250	\$5,000,000	\$20,000
Questa Mine	New Mexico	Molycorp	Molybdenum	3,000	\$156,000,000	\$52,000
Tyrone	New Mexico	Phelps Dodge Corp.	Copper	6,000	\$50,000,000	\$8,333
Tyrone - Little Rock	New Mexico	Phelps Dodge Corp.	Copper	125	\$1,500,000	\$12,000
Gilt Edge	South Dakota	Brohm Mining Corp.	Gold, Silver	263	\$12,850,000	\$48,859
Golden Reward	South Dakota	Golden Reward Mining Co.	Gold, Silver	397	\$1,549,000	\$3,902
Homestake	South Dakota	Homestake Mining Co.	Gold, Silver	550	\$1,737,000	\$3,158

TABLE 2: continued

Mine Name	State	Ownership	Commodity	Disturbed Area, Acres	Existing Financial Assurance, Total	Existing Financial Assurance, \$/acre
Richmond Hill	South Dakota	Lac Minerals Inc.	Gold, Silver	321	\$10,700,000	\$33,333
Wharf	South Dakota	Wharf Resources	Gold, Silver	655	\$4,113,000	\$6,279
Barneys Canyon	Utah	Rio Tinto Kennecott	Gold, Silver	1,072	\$4,604,000	\$4,295
Bingham Canyon	Utah	Rio Tinto Kennecott	Copper	27,090	\$33,214,000	\$1,226
Drum Mine	Utah	Western States Minerals	Gold, Silver	144	\$264,080	\$1,834
Escalante Silver	Utah	Hecla Mining Co.	Silver	108	\$389,300	\$3,605
Goldstrike Project	Utah	USMX Inc.	Gold, Silver	387	\$929,200	\$2,401
Lisbon Valley Copper	Utah	Summo USA Corp.	Copper	395	\$2,689,000	\$6,808
Mercur Mine	Utah	Barrick Mercur	Gold, Silver	1,719	\$8,808,891	\$5,124
Kettle River	Washington	Echo Bay Mines Ltd.	Gold, Silver	41	\$832,666	\$20,309
Republic	Washington	Hecla Mining Co.	Gold, Silver	38	\$2,513,785	\$66,152
Total				271,544	\$1,402,282,404	\$5,164 (avg)

¹ No mines presently exist in Hawaii, Oregon and Wyoming with financial assurance amounts greater than \$250,000 so those western states are excluded from this analysis.



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