Preventing Perpetuity: Ensuring Clean Mine Closure Without Water Treatment Into Infinity

Nicholas Clabbers, University of Colorado Boulder
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I. Introduction

The mining industry is deeply ingrained in the fabric of American history and in the economy of today. In the western United States, hard-rock mining\(^1\) began in earnest with the California gold rush in the late 1840s, and shortly thereafter, was legislatively supported by the General Mining Act of 1872.\(^2\) This Act officially opened the federal public lands for exploration and prospecting. As a result, mining and the overall population of the West grew exponentially over the following several decades, especially with respect to Californian gold.\(^3\) As the industry developed and spread throughout the West, the negative consequences of mining became readily apparent. Landscape degradation and water pollution were the primary culprits during operation, and once miners went bankrupt (as was so often the case),\(^4\) the mines were simply abandoned. The vast majority of most early mines were poorly run to begin with, and once abandoned, those environmental problems were generally left unaddressed.\(^5\)

While the mines of the nineteenth century are far in the past, there are still new mines being planned all over the American West. Today’s mines operate at a much

\(^1\) Hard-rock mining does not refer to coal, gas, or oil.

\(^2\) See 30 U.S.C. §22 (2013). Despite the Act’s short length, the scope of the lands and minerals officially opened to miners was incredibly broad: “[A]ll valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, shall be free and open to exploration and purchase...”


\(^4\) JAMES J. RAWLS AND RICHARD J. ORSI, A GOLDEN STATE: MINING AND ECONOMIC DEVELOPMENT IN GOLD RUSH CALIFORNIA 7 (1999) (“Historian Oliver Lewis has estimated that fewer than one out of twenty California gold seekers returned home richer than when they left.”).

larger scale than those of previous generations, and as such, the environmental and financial challenges are of much greater concern. Scientists and policy-makers now recognize the magnitude and impacts of this past abandonment, and the need for proper closure planning in the mines of today. Unfortunately, systemic problems with current mining regulations exacerbate water pollution issues. When designing solutions, valid industry concerns must be balanced with much-needed environmental protection. This has proven to be a difficult task, and has created acrimony in areas where legislators have changed mining regulations. Nevertheless, using several current states as models, it is possible to develop a proactive and comprehensive regulatory structure to prevent abandonment of potentially dangerous mines and creation of permanent water quality issues.

This note addresses the problems and potential solutions related to mine closure and the treatment of water from those closed mines. The first section describes the problems associated with closing mines, focusing specifically on the issue of perpetual water treatment and the difficulty of making accurate predictions about water quality. This section focuses on the financial and environmental impacts of perpetual water treatment on a variety of stakeholders: taxpayers, governments, and mining companies. The second section examines the current legislative and regulatory frameworks being used to combat these problems. To illustrate the divergent approaches to this issue, this section reviews several examples of regulatory structures from American states.

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6 There is simply no way to accurately determine the number of abandoned mines in the early history of the American west, but various entities have undertaken projects to count and map dangerous sites in order to remediate them. See, e.g., Nevada Bureau of Mines and Geology: Mining Records, UNIV. OF NEV. RENO, http://www.nbmg.unr.edu/Mining/MiningRecords.html (last visited Feb. 11, 2015); Abandoned Mine Lands, U.S. BUREAU OF LAND MGMT, http://www.blm.gov/ut/st/en/prog/more/Abandoned_Mine_Lands.html (last visited Feb. 11, 2015) (describing the vast number of abandoned mines on BLM land in Utah).
section also briefly examines federal statutes and regulations, assessing their ability to handle the problem and the intersection that these laws have with state jurisdiction. Finally, this article proposes that continued state legislative action is needed to prevent and mitigate future problems, most specifically by following the model of New Mexico, which prohibits new mines unless the company can prove that they will not require water treatment after closure. This article describes the essential elements of a successful regulatory regime, specifically focusing on effective enforcement and standards, which allow case-by-case assessment of new mining operations. The widespread problem of perpetual water treatment as a result of abandoned and closed mines can and should be remedied with proactive legislation that will prevent new mines from opening until operators can prove that such treatment will not be necessary.

II. Mine Closure and Perpetual Water Treatment: An Overview of the Problem

Even the largest and most productive mines will eventually become economically inefficient. The costs of extracting minerals will exceed the value of those goods, and mine operators will face the task of closing their mine. Unlike a storeowner or other businessperson, mining companies may not simply sell their inventory and move out of town. Mine closure requires a host of other considerations, not only for the operator, but for the government and local communities as well. The biggest concern is that the cleanup costs and environmental damages will last “into perpetuity,” meaning that the water quality will never improve to a state where a cleanup crew can simply walk away. In these situations, the eventual costs may very well outweigh the short-term benefits of the mine while it is in operation. These costs can be divided into two separate (but related) issues: the environmental impacts on the surrounding land and water caused if
the company has not put in place adequate safeguards for water treatment, and the immense financial implications for governments and taxpayers if the company responsible for the cleanup defaults on their obligations.

*Environmental Impacts of Mine Closure*

Mining can be a safe and profitable enterprise if owners and operators are careful and clean. However, even in properly run mines, the risks of environmental damage are large. In most locations, mining requires a large amount of water, and toxic minerals and acid can leach into surrounding water supplies.\(^7\) During active operation of a mine, most responsible operators will have a system to treat or contain contaminated water. After closure, however, there is typically a reduction in personnel and attention at the site, and the environmental risks correspondingly increase. This is most often not a short-term problem; mine waste and acidic water do not simply “disappear” or become harmless after a period of time. Mining byproducts and waste can theoretically pollute water forever, mostly because the exposed minerals will be subject to rain and other weather conditions. In particular, the threat of acid mine drainage and metal leaching becomes pressing after a mine closes, as the impacts from these processes can last far into the future if they are not addressed quickly:

> Acid mine drainage and metal leaching (AMD/ML) may not start for decades or more after mine waste is first exposed to the elements. Once this chemical process begins, it can persist for hundreds to thousands of years. … There are some means of [preventing and treating] AMD/ML, but there is no walk-away solution. A mine that

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\(^7\) For a succinct summary of other environmental effects that often need to be addressed at the reclamation stage, see Gregory P. Williams, *Closing a Hardrock Mine – Can You Ever Walk Away?* 39 ROCKY MT. MIN. L. FN. §10.02 (1993).
Mine waste is often exposed to the elements while a mine is still in operation, thus speeding up the described chemical process. After closure, the exposure risk increases because of the reduction in oversight and consistent maintenance.

Many types of mines will require some monitoring or active remediation in order to mitigate potential harms. This monitoring is not necessarily a negative outcome; a five, ten, or twenty-year cleanup plan is not uncommon and can often leave a mine site in a completely usable condition. The most dangerous mines, however, are those that require perpetual treatment after closure. Operators who are unable to contain or otherwise mitigate the environmental hazards of their mine within a certain time period may instead choose to treat the water forever (or as long as they can). This may be a workable solution for a period of time, but as financial concerns complicate the scenario, the probability of success drastically decreases.

In the event that perpetual treatment does fail, the environmental consequences are readily apparent. Contaminated water can kill aquatic life, render entire ecosystems uninhabitable, and poison humans in the event that harmful chemicals reach the surrounding water supply. Permanent water pollution caused by acid mine drainage or other chemical is especially concerning when coupled with water supply issues in the arid West. In Nevada, for example, the years 1986 – 2001 saw 580 billions gallons of water

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9 For purposes of simplicity, “perpetual treatment” refers to the perpetual treatment of water.
pumped out of the Humboldt River to feed mining operations - roughly the amount needed to supply all of New York City for a year.\textsuperscript{11}

The Summitville mine, located in the San Juan Mountains of Colorado, illustrates the hazards of acid mine drainage, both during operations and after closure. In 1990, two years before the mine closed, state officials suspected that acidic water from the site was leaching into the Alamosa River, killing a large number of fish, sickening cattle, and impacting agriculture.\textsuperscript{12} After the mining company declared bankruptcy and abandoned the site in 1992, the U.S. Environmental Protection Agency (EPA) was forced to step in and place Summitville on the federal Superfund list. There were dangerous amounts of contaminated water held behind a dike, which threatened to overflow in thunderstorms or times of high snowmelt.\textsuperscript{13} Although the EPA and the state of Colorado have done significant remediation work on the site, the Alamosa River below Summitville is still incapable of supporting aquatic life.\textsuperscript{14}

\textit{Financial Costs of Mine Closure}

Generally, mining companies and corporations do not exist forever, as they often go through mergers, acquisitions, or bankruptcy. By contrast, the water pollution, and subsequent financial obligation to treat that hazard, will persist for years beyond the closure of the mine. A recent computer model assessment of a proposed iron mine site in Minnesota found that “either active or passive water treatment will be needed for 200

\textsuperscript{11} Id. at 4.
\textsuperscript{13} Id.
\textsuperscript{14} Despite all of the problems associated with water quality in the region, there are no human inhabitants within two miles of Summitville, and as such there have been no reported public health risks. See Summitville Mine – Implementing the Recovery Act, EPA.GOV, http://www.epa.gov/superfund/eparecovery/summitville_mine.html (last visited Feb. 11, 2015).
years for [one facility], and up to 500 years for [a second facility], [and] would cost between $3.5 and $6 million per year after the mine closes.”

In the planning stages, most governments will require companies to post a bond or security that can be used for cleanup in the event that the mine goes out of business. “The goal of [these] financial assurance requirements is to mitigate the risk of creating the next generation of abandoned mine lands and associated features.”

However, the nature of corporations is such that securing a reliable bond is unlikely, and the bond is not always sufficient to cover the entire cost of cleanup. Financially, mining corporations are usually in the best position to mitigate the damage that they have caused, but it remains difficult to secure adequate amounts of funding.

Equitably, companies who caused the damage should bear the financial responsibility, but the reality is that companies who are facing mine closure often simply do not have the funds to pay for remediation. “Mines almost always close when they are losing money and their operators are strapped for funds…and [this is] almost a guarantee that [closure planning] will not be done well.” Plus, the company may find it cheaper to ignore remediation in favor of forfeiting the bond, which is often much lower than the expected costs of cleanup.

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19 CHAMBERS, *supra* note 17 at 2.
If the corporation defaults on its financial obligation, the burden generally falls to the government, and taxpayers are left responsible for irresponsible mining or a financially inept corporation. Estimates of the cost of current pollution control and water treatment (in the US) are between $57 and $67 billion per year.\textsuperscript{20} By contrast, the annual EPA Superfund budget is approximately $775 million.\textsuperscript{21} The federal government spent nearly $3 billion between 1998 and 2007 to clean up polluted rivers and lands related to hard-rock mining sites.\textsuperscript{22} The United States General Accountability Office conducted a broad study on abandoned hard-rock mining sites located on Bureau of Land Management (BLM) lands and concluded that as of July 2004, 25 of the 48 studied sites had an inadequate amount of funds to pay the estimated costs of reclamation.\textsuperscript{23} In some cases, the plans have not been updated in many years, leaving the bonds severely undervalued. This study only examined mines on federal BLM land, and so the federal government bears the financial obligation in those situations, but the problems remain the same at the state level.

The Summitville mine is a stark example of the typical bonding and security requirement’s failure at the state level. While the mine produced approximately $81 million in gold over an eight year period, the bond posted by the owner was about $5 million.\textsuperscript{24} In 1992, the mining company filed for bankruptcy, the state did not have enough money to combat the vast amounts of pollution, and the EPA was left with a $170

\begin{itemize}
\item \textsuperscript{20} \textsc{Earthworks, Polluting the Future}, 7 (May 2013), available at http://www.earthworksaction.org/files/publications/PollutingTheFuture-FINAL.pdf.
\item \textsuperscript{21} \textsc{Id.}
\item \textsuperscript{22} Marcoty, \textit{supra} note 15.
\item \textsuperscript{23} \textsc{Joan Kuyek, The Theory and Practice of Perpetual Care of Contaminated Sites}, 48 (July 2011) (citing Gov. Accountability Office, Hardrock Mining: BLM Needs to Better Manage Financial Assurances to Guarantee Coverage of Reclamation Costs 05-377 (June 2005)).
\item \textsuperscript{24} See Barlow, \textit{infra} note 25 at 340.
\end{itemize}
million cleanup bill.\textsuperscript{25} Even when a company leaves behind a larger bond, the costs of remediation frequently exceed the posted amount. The tandem Zortman-Landusky gold mines in Montana closed in 1998 when their operator, Pegasus Gold, declared bankruptcy.\textsuperscript{26} Within ten years, government cleanup authorities spent the entirety of the $40 million reclamation/water treatment bond, leaving the state of Montana and the federal Bureau of Land Management to handle the $12 million total cost overruns (so far), plus the yearly $1.5 million in water treatment costs.\textsuperscript{27} The state of Montana allots $750,000 per year to pay water treatment costs statewide, only half of the needed amount for just this one site.\textsuperscript{28} “Recent projections indicate that cumulative distributions for water treatment [at Zortman-Landusky] will be about $7.5 million short of actual costs by the year 2017.”\textsuperscript{29}

\textit{What Causes These Problems?}

These systemic problems are largely caused by difficulties in predicting the eventual damage at the sites (and the subsequent costs to monitor and remediate them). If companies could accurately predict the future water quality at a given mining site, the chances of securing a sufficient bond would certainly increase. However, predictions of future water quality and costs are notoriously unreliable. A recent study examined the discrepancy between predicted and actual water quality at mines across the United


\textsuperscript{26} \textit{Infra} note 28.

\textsuperscript{27} \textit{Infra} note 28.

\textsuperscript{28} For more on the financial hardships facing the Montana government in connection with the Zortman-Landusky mine, see Zortman-Landusky, MONT. DEPT’. OF ENVT'L QUALITY, \texttt{http://deq.mt.gov/recovery/remediation/zortmanlandusky/default.mepx} (Sept 6, 2012).

States.\textsuperscript{30} During the permitting phase, most of these mines predicted a low potential for water quality issues.\textsuperscript{31} Roughly 60% of the mines had a worse water quality than what operators predicted at their inception, even taking mitigation measures into account.\textsuperscript{32} The study broke down each “failure” into one of three categories: geochemical, hydrologic, or engineering/mitigation planning.\textsuperscript{33} While the distinctions are not necessarily relevant to the analysis here, the categorization illustrates the many pitfalls associated with obtaining an accurate prediction of future water quality. Some of the physical factors impacting actual post-closure costs include: geographic scope and nature of the ultimate disturbance; reclamation effectiveness; the concentrations and volume of the effluent; climate variability; climate change; and the nature of effected resources.\textsuperscript{34} Beyond just physical issues, there are even more factors to consider: government and political changes, labor and material costs, and force majeure events (fire, earthquake, etc.) that may drastically increase the costs of environmental mitigation.\textsuperscript{35} Furthermore, the costs of technology are uncertain, as there may be new or cheaper methods available in future years.\textsuperscript{36} As it stands, there are few, if any, accurate, long-term, predictions for costs related to water quality.

Even if environmental damage could be accurately predicted, the volatility of the financial markets would make ascertaining the correct bond level very difficult. A number of factors are simply impossible to predict, and the consequences of an incorrect

\begin{itemize}
\item \textsuperscript{31} Id at 27.
\item \textsuperscript{32} Id at ES-8.
\item \textsuperscript{33} Id at ES-14.
\item \textsuperscript{34} Kempton, supra note 29 at 11.
\item \textsuperscript{35} Kempton, supra note 29 at 9-10.
\item \textsuperscript{36} Kempton, supra note 29 7.
\end{itemize}
assumption can be disastrous. As stated by David Chambers, president of the Center for Science in Public Participation:

When bonds are established, an agency not only makes assumptions about the long term replacement and operating costs of a treatment plant, but the agency must also make assumptions about the average inflation over the period of time covered by the bond and the average return-on-investment the bond amount will generate over its lifetime. … Typically, changing either the inflation rate or the rate for return-on-investment by a single percentage point will cause a huge change on the required bond amount.  

States (and the federal government, if the mine is on federal land) run programs to ensure remediation of an abandoned mine site, but they are generally ill equipped to handle the huge problems put before them. In theory, these programs deal with environmental and financial problems if the company defaults. Nearly every mine requires some sort of monitoring or treatment after it closes, but the duration of such activities depends on (among other things) the initial planning before the mine is opened and on the finances of the company after closure. But because of the enormous costs of reclamation, these government programs are simply inadequate to deal with all of the potential sites.

III. Current Legal and Regulatory Approaches

Before a mine may open, a mining company must submit a plan for approval by the relevant state licensing agency, which will then issue (or deny) a permit based on the proposed plan. The exact contents of these plans vary from state to state, but the typical framework involves an environmental assessment during exploration and active operation. These matters are beyond the purview of this note.

37 CHAMBERS, supra note 17 at 1.  
38 Williams, supra note 7 at §10.01.  
39 WARHURST, supra note 18 at 316.
In addition, most states also require some sort of reclamation or mine closure plan. States approach the issues associated with mine closure in a variety of ways. In Colorado, the state government requires financial assurance before issuing a permit to insure against the potential damages after mine closure, but does not require any specific finding related to water quality or perpetual treatment after closure. New Mexico, Michigan, and Wisconsin all take a different approach, prohibiting the licensing agency from issuing a permit if the company cannot prove (using varying standards) that their mine will not require perpetual treatment after closure.

**Colorado: A Traditional Approach**

In terms of mine permitting, Colorado is one of the “traditional” mining regulation states, meaning that the Mining Board must “receive performance and financial warranties” before a mining permit may be issued.40 While a performance warranty is simply a contract binding the company to the terms of their proposed plan (including closure),41 a financial warranty binds the company to the “reclamation costs up to the amount specified by the board…with proof of financial responsibility.”42 In Colorado, “the board may accept interests in real and personal property as financial warranties,”43 but is statutorily authorized to refuse any bond proposal that is “dependent upon the success, profitability, or continued operation of the mine” or “cannot reasonably

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41 Id. (2).
42 Id. (3)(a).
43 Id. (3)(b).
be converted to cash within [180] days of forfeiture.” Essentially, the law attempts to ensure that liquid assets will exist regardless of whether the mine makes a profit or not.

The amount of the bond can be changed over time, either upon the change of the mining permit (i.e., a change in the operational structure of the mine) or simply upon the action of the board itself, which retains the authority to “increase or decrease the amount or duration of required financial warranties.” After the mine has closed, a mine operator must file a “written notice of completion…upon completion of all requirements…with respect to any or all of such operator’s land,” at which point the state agency has sixty days to inspect the land for completion. If the inspection is not completed within the sixty-day period, the plan is deemed fulfilled as a matter of law, and the bond is returned to the guarantor. A bond can be forfeited by a company which is found to be “in default under his performance warranty and has failed to cure such default,” or has “failed to maintain his financial warranty in good standing.”

This system is well intentioned, but flawed for a number of reasons. This type of system is a huge drain on administrative resources, mainly in keeping up with bond requirements (i.e., how often and by how much should they change). Even a small change in a mining permit plan can result in increased costs during reclamation, but agency staff may not recognize or act on the changes to increase the bond accordingly.

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44 Id. (3)(c)(I)-(II).
45 Id. (4)(c)(I)(A). Some states require a periodic review of a company’s bond, even if they do not change their operation. Montana requires a review every five years. See KEMPTON, ET AL., supra note 29 at 22.
46 COLO. REV. STAT. §34-32-117(5.5)(a)(I).
47 Id. (5.5)(a)(II).
48 Id. (5.5)(d).
49 COLO. REV. STAT. §32-32-118(b) (2013).
50 Id. (e).
51 See WARHURST, supra note 18 at 332-37.
Mining departments in many states are perennially understaffed and overworked,\textsuperscript{52} increasing the likelihood that reclamation inspections will not be completed within the sixty-day statutory window. This means that companies are likely to have their bonds returned as a matter of law, even if they may not have completed all of their reclamation work. From a financial standpoint, a company may actually choose to default and lose its bond if it believes that the full cost of reclamation will exceed what they have already paid to the state. Thus, the state is forced to cover the difference, while the company may legally be in the clear.\textsuperscript{53} If a company goes bankrupt, the state merely becomes one in a large pool of creditors, with little hope of being repaid for the costs incurred in reclamation or treatment. Colorado clearly tried to address the problem of bankruptcy in tying the bond requirement to factors outside the profitability of the mine. However, a company may still make a profit from one mining operation while suffering losses in others.

\textit{New Mexico, Michigan, and Wisconsin: “Prove it First” Laws}

Other states have chosen a very different route for their mining industries. The funding and financial guarantee provisions in these states are somewhat similar to the structure in Colorado. However, their key difference is that permits are only issued upon completion of a very important condition precedent: the company must prove that their proposed mine will not require perpetual water treatment.

\textsuperscript{52} Michael Jamison, Missoulian, \textit{Mining regulator says department is understaffed} (Dec. 26, 2004), \textit{available at} http://www.highbeam.com/doc/1P3-778527151.html.

\textsuperscript{53} Of course, the state may have claims under other statutory provisions against a mining company that chooses to default.
Two states (New Mexico and Michigan) prohibit a mine from going forward unless the permit applicant can prove that perpetual water treatment will not be necessary after closure.\textsuperscript{54} Idaho and Montana have proposed similar legislation, but the mining industry has staunchly opposed its passage.\textsuperscript{55} In New Mexico specifically, the actual provision of the Mining Act of 1993 states that no company shall receive a permit to mine unless their planned operation “is designed to meet without perpetual care all applicable environmental requirements imposed by the New Mexico Mining Act and regulations adopted pursuant to that act.”\textsuperscript{56} The Michigan provision is within the Nonferrous Metallic Mining Regulations (commonly called Part 632), which states that a permit shall not be granted unless “both the mining area and the affected area shall be reclaimed to achieve a self-sustaining ecosystem appropriate for the region that does not require perpetual care following closure and with the goal that the affected area shall be returned to the ecological conditions that approximate premining conditions…”\textsuperscript{57}

Wisconsin takes this plan a step further. In 1998, the state enacted a special kind of “prove it first” law, which “requires that before the state can issue a permit for mining of sulfide ore bodies, prospective miners must first provide an example of where a metallic sulfide mine in the United States or Canada has not polluted surface or groundwater during or after mining.”\textsuperscript{58} The law passed with broad majorities in both

\textsuperscript{54} Kempton, et al., supra note 29 at 5-6.
\textsuperscript{56} N.M. STAT. ANN. §69-36-12(4) (West 2013) (emphasis added). The relevant regulations do little more than restate the statutory guidelines: “The operation will be designed to meet without perpetual care all applicable environmental requirements.” N.M. CODE R. § 19.10.6.603(H) (2013).
\textsuperscript{58} Al Gedicks, Mining Industry Targets “Prove It First” Law, Wisconsin Citizens Media Cooperative (Feb. 2, 2013), http://wcmcoop.com/2013/02/01/mining-industry-targets-prove-it-first-law/ (emphasis added).
houses of the state legislature, drew support from sixty community organizations, and had
petitions signed by more than 40,000 citizens.59 According to a 1995 report to the
Wisconsin Department of Natural Resources, “there are no ideal metallic mineral mining
sites which can be pointed to as the model approach in preventing acidic drainage
industry-wide.”60 When considering these all of these facts together, Wisconsin’s law
essentially amounts to a de facto moratorium on hard-rock mining. In fact, the law is
colloquially known as the Mining Moratorium law, and no new mining operations have
been permitted in Wisconsin since the law was enacted.61

It is somewhat surprising that these “anti-mining” laws passed state legislatures,
especially in states with rich mining histories and economic struggles. Indeed, New
Mexico still faces opposition over the strict law, with the State website noting that “some
in industry…argue that the increased requirements for new mines imposed by the Mining
Act and by other agencies discourage perspective [sic] mine development in New
Mexico.”62 With growth in the mining industry stagnant, Wisconsin’s law has become a

The actual statutory provision states that “The department shall not issue a permit…unless: The department determines, based on information provided by an applicant for a permit…that a mining operation has operated in a sulfide ore body which, together with the host nonferrous rock, has a net acid generating potential in the United States or Canada for at least 10 years without the pollution of groundwater or surface water…[and the operation] has been closed for at least 10 years without the pollution of groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals.” Wis. Stat. Ann. § 293.50(2)(a)-(b) (West 2013).


61 See Gedicks, supra note 58; SIERRA CLUB, supra note 59. Although no mines have begun operation, one mining company has received an exploration permit and drilled test holes in a potential gold deposit. See, Recent and potential metallic mining projects in Wisconsin, WISC. DEP’T OF NATURAL RES.,

62 FAQ – Mining Act Reclamation Program, N.M. ENERGY, MINERALS, AND NATURAL RES. DEP’T.,
political and industrial lightning rod, especially over the past few years. Republican Governor Scott Walker made his top legislative priority of 2013 to repeal the Mining Moratorium Law, stating: “We believe there's no other bill the Legislature can pass this session that will more directly result in job creation.”

Wisconsin Manufacturers and Commerce (a large industry group with a strong lobbying presence in the state legislature) cited a Canadian study that declared Wisconsin’s mining laws “the worst in the world” for investment. Predictably, environmental groups, and one former head of the Wisconsin Department of Natural Resources, are outspokenly against any reform to the current mining law. After a protracted battle, Governor Walker failed to repeal the law, and it remains on the books as of this writing. However, in March 2013 the Governor signed Wisconsin Act 1, which essentially exempted the iron mining industry from the Moratorium and placed ferrous minerals (iron) under a completely separate regulatory regime. This Act cleared the way for a reported $1.5 billion iron mine in the

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65 “You have heard repeatedly that [Walker’s proposal] doesn’t lower environmental standards…[l]et me be blunt: that is a falsehood.” Kemble, supra note 63.


northern part of Wisconsin to begin permitting, although environmental and community
groups have vowed to fight both the law and any proposed permit. 68

In New Mexico and Michigan, the schemes have produced mixed results, and an
accurate assessment is difficult to establish. For one, there are very few examples of
mines constructed after these regulations. In New Mexico, no large-scale mine has been
permitted since the passage of the law, although several smaller mines have opened and
are currently operating. 69 To date, Michigan has permitted only one mine, and another is
in the application stages. 70 Second, the statutes and regulations are powerful on their
faces, but enforcement of the provisions has been lax, especially in Michigan. Michigan
received an overall rating of “poor” for its enforcement of mining regulations from the
National Wildlife Federation. 71 The state DEQ issued permits to one major project, but
numerous legal challenges have stalled actual construction. 72 Finally, because none of
the new mines have closed, it is too early to tell if their closure plan predictions were
accurate.

One measure of the laws’ impact is apparent in the monetary expenditures now
needed for permitting. In New Mexico, there is evidence that the law has increased the
cost of doing business for both industrial actors and the state government. A prominent
non-profit law firm, the New Mexico Environmental Law Center, states that since the
passage of the law in 1993, they have “participated in nearly every major hardrock mine

legislation-2993uca-197079281.html.
69 FAQ, supra note 62.
70 NAT’L WILDLIFE FED’N, SULFIDE MINING IN THE GREAT LAKES REGION 17 (March 2012).
71 Id at 75. The NWF notes that although “standards for reclamation and remediation must be approved as
part of the permit application, many environmental groups and other citizen opponents of [a major project]
have cited numerous areas where DEQ allegedly did not meet the regulatory standards for permit review.”
Id at 78.
72 Id.
permitting proceeding in the state [and] have succeeded in persuading the State to mandate some of the highest reclamation bonds in the nation…”73 In one of those permitting procedures, litigation surrounding closure requirements took nearly ten years.74 In a press release announcing a final settlement of the issues, the New Mexico Environment Department lauded the settlement’s protection of groundwater, but also noted that the Department (and the company) “can now spend resources protecting water quality rather than on disputes that drain the state’s limited resources.”75

It is impossible to assess the substantive success of the Wisconsin Mining Moratorium law because there have been no new mines under the current regulatory system. From an environmental perspective, no new mines certainly means less pollution, but if the goal is to balance environmental concerns with those of the mining industry, then the system must be viewed as a failure. In addition, the polarity of the law means that it is a politically charged issue; any attempts at reform almost certainly would be met with resistance from some segment of the population.

A Note on Federal Laws

Mine permitting is, for all intents and purposes, a state matter. The federal government is not authorized to grant or deny permits, except under a limited set of circumstances that are actually unrelated to mining. This authority comes primarily from statutes that are designed to regulate mediums, not industries. Limits for certain discharges, including into the air, soil, and water, are set through federal laws and

75 Id.
regulations like the Clean Water Act. In this sense, from a regulatory perspective, ‘mining law’ in the United States is environmental law.”

A mine proposed for federal land must go through the appropriate federal permitting processes, but there are no mining-specific federal regulatory statutes.

The federal government may pursue a mine operator who has defaulted on his obligation (or is simply violating pollution standards) under the general authority of the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund). In fact, EPA reported 20% of inspected sites between 1990-1995 were subject to some kind of enforcement action for pollutant discharges. However, these laws are primarily remedial, not preventative, which limits their effectiveness against problems before they start. The government is usually coming in after an operator has run out of money and abandoned a site, leaving the taxpayers to bear a huge financial burden. CERCLA does allow the agency to clean up dangerous sites immediately, but only allows cost recovery after an arduous legal process. Thus, EPA is often financially and logistically responsible for sites with immense liabilities.

The federal process resembles the Colorado system and is subject to many of the same issues. Space constraints here prohibit a thorough exploration of the nuances of

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76 WARHURST, supra note 18 at 314-15.
78 “The general federal policy with respect to environmental law has consistently been to regulate specific media separately rather than to comprehensively regulate the broader ‘environment’ or to regulate particular industries or activities specifically.” Id at 16.
79 Seymour, supra note 5 at 823.
80 See 42 U.S.C. §9607(a).
81 Seymour, supra note 5 at 859.
federal permitting. Although the BLM permitting process requires a financial bond to be posted for projects located on federal land, the federal bonding and security framework is plagued with many of the same issues of uncertainty and business defaults.\(^{82}\)

**IV. Addressing the Problem**

Environmental protection regulations are often pitted as “industry against the environment,” as if the two goals are mutually exclusive. While this may be true in some regard, the ideal regulation will find a balance between these two interests and seek to work in a way that can benefit both. In the mining industry, well-written and enforced regulations can serve to protect the environment and hold operators accountable for their actions. The key to effective regulations is a focus on proactive, not remedial, provisions that can combat problems before they begin.

To some degree, mines that are already open and operating have been “lost” to the current reclamation and bonding system. This is not to say that abandonment, operator bankruptcy, or perpetual treatment is inevitable, but rather that the current operations will not have the benefit of strict regulatory oversight from their inception. The system could still be modified to provide for higher bonds or stronger environmental protections, but it is much more difficult to mitigate damage from existing operations than it is to proactively plan for closure before a mine opens. Thus, the primary solution to the problem of perpetual water treatment is to change the initial permitting process. Justice Brandeis’s famous “laboratories of democracy” theory applies here,\(^{83}\) as mining

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\(^{82}\) See KEMPTON, ET AL., *supra* note 29 at 4-5.

\(^{83}\) “It is one of the happy incidents of the federal system that a single courageous state may…serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country.” New State Ice Co. v. Liebmann, 285 U.S. 262, 386-7 (1932) (Brandeis, J., dissenting).
regulations across various states show varying degrees of success. An analysis of the current systems provides a workable solution.

The New Mexico/Michigan model provides the greatest amount of protection to the environment and public while still allowing responsible mine operators to conduct safe businesses. While there is not much empirical data to assess the effects of the New Mexico law, anecdotal evidence suggests that it has been successful in striking some kind of balance between industrial and environmental interests. “A number of new mines have received permits under the act. However, the new mines have been fairly small, and no new large metal mine has been permitted under the act.”\(^\text{84}\) To be fair, few new large metal mines have opened anywhere in the United States, with companies looking instead to other countries with lesser regulation and richer deposits of ore.\(^\text{85}\) But the environmental damage of poorly run, large mines can be disastrous. As a result of the 1993 legislation, New Mexico has “avoided the disasters such as Summitville, Zortman-Landusky, and other mine bankruptcies...”\(^\text{86}\) While dodging these environmental disasters, New Mexico permitted some small-scale mines, proving that operators are willing and able to conform to the regulations under the right economic conditions. True, New Mexico may no longer have the large mines of the past, but the system is working as intended by preventing troublesome operations while still allowing for some economic growth.

By contrast, Wisconsin’s law has effectively killed its mining industry. An operator wishing to mine in Wisconsin is faced with a nearly impossible task: provide an

\(^{84}\) FAQ, supra note 62.
\(^{85}\) Id.
\(^{86}\) Id.
example of a mine needing no treatment after ten years. Environmental protection is certainly important, but in Wisconsin it has come at the expense of a once profitable and economically beneficial industry. Because of its one-sided nature, the law may have actually produced more issues than New Mexico’s model, even though there are fewer (no) mines. For one, the political strife has been enormous. Instead of setting up a workable regulatory regime, Wisconsin’s outright ban encouraged industry groups to fight the regulations. Community groups allege that industry is using aggressive lobbying tactics\(^\text{87}\) and denying their property rights\(^\text{88}\) to assure more favorable treatment. A Democratic state representative noted the influx of money into the government from the mining industry, saying that “the Legislature is being told what to do by Wisconsin Manufacturers & Commerce, who proudly tell people that they spent $2 million [in campaign contributions] on the Legislature.”\(^\text{89}\)

Even putting aside the political problems, the Wisconsin law does little for environmental protection. Because the law gives a mining company the opportunity to show an example of a non-polluting operation in the United States or Canada, it is unlikely that their examples will accurately resemble their planned mine in Wisconsin. A prominent geology professor at the University of Wisconsin said: “It doesn't help us regulate a particular operation. The mining moratorium bill is not structured around Wisconsin, it's structured around other places. What constitutes a violation in Colorado?

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What authority did they have? The former head of the Department of Natural Resources described the incongruity of one particular permit application, where the company cited a mine in the tundra of northern Canada and another in the desert of Arizona.

In an extreme sense, overall environmental protection may actually be weaker as a result of the Mining Moratorium Law. Wisconsin Act 1 (the iron mining regulations) exempts an entire segment of mining from environmental regulations. This new law was passed in an attempt to escape the stifling regulations under the Moratorium Law. Despite arguments to the contrary, “an analysis by nonpartisan attorneys who work for lawmakers said in some areas the new legislation is ‘less stringent’ than current environmental law.” Without adequate oversight in the iron mining industry, the potential for environmental damage increases.

In sum, Wisconsin’s law is not a sustainable model for mine closure planning. But, the experience is not entirely wasted: taking the positive aspects of New Mexico’s laws and applying the mistakes learned from Wisconsin’s experience, states can produce a mine permitting process that will properly account for environmental and financial concerns following closure.

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90 Id.
91 Id.
92 Wisconsin Act 1 exempts iron mining from the state’s standard environmental regulations, instead creating an entirely new and less stringent set of rules. It also allows for a different review process, with less public scrutiny. Bergquist & Marley, infra note 93.
First, it is important to understand the mechanics of water treatment and prohibit any mine closure plan that calls for perpetual treatment of water. This is the keystone of an effective permitting system. The best method of preventing perpetual treatment is to require companies to plan for a world without it, and to force them to adhere to that plan. Active treatment (meaning some machinery or purification system) is likely, but only for some definite period of time after mine closure. A semi-accurate prediction of an end date should be necessary before any operation is permitted to begin. Granted, the uncertainties associated with water quality predictions will present challenges, but with greater experience and data collection, models will likely improve. In any case:

Water quality predictions can never be expected to accurately portray complex natural systems and actual water quality will always be different than that predicted. The focus should be on whether the prediction has identified areas of concern such that proper mitigation can be designed and implemented if necessary. Prediction results can be used to guide project implementation and design.94

Thus, it is not the exact mathematical predictions of water quality that matter, but simply the design and care put into the operation and reclamation plan at the outset. It is not necessary to pinpoint the specific date that water treatment may end, nor the concentration of acid that is allowable. It is enough to determine that a mine site has a conceivable end date, one that can serve as a useful guidepost for financial planning before it becomes too late. The uncertainties can be addressed “by adding conservative contingency costs to scope, design, and construction estimates,” and further mitigated through a periodic assessment of the bond’s adequacy.95

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95 KEMPTON, ET AL., supra note 29 at 7.
Second, any system of regulation, no matter how well-designed, requires strong enforcement in order to be effective. Stage agencies must consistently check a mine’s operation, throughout its lifespan to ensure that operators are fulfilling the elements of their plan. Policy-makers can learn from the Michigan experience, where community members have accused the DEQ of lax enforcement and a slow response to problems.96 Otherwise, the operator is free to run the mine as he sees fit, defeating the purpose of an initial plan. Agencies will require more manpower, administrative resources, and (above all) money. State governments can gather needed revenue by increasing mining permit prices. If the mining industry is interested in beginning a project, they will need to plan accordingly for increased costs. In addition, an increase in agency resources and enforcement will likely increase the number of regulatory violations and fines recovered from industry. This is not a reliable or consistent source of income, but it would be a side benefit of added personnel and capacity. Just as the physical operation must be inspected and regulated, so must the financial bond and securities. The agency should review the company’s bond periodically, to ensure that the operation has sufficient insurance in the event of bankruptcy.

The most crucial aspect of this regulatory system is the actual threshold standard for water quality. The aforementioned uncertainties surrounding financial obligations and water quality predictions (and the intersection of the two) can be somewhat mitigated by setting a concrete and reachable standard. However, because of the diverse factors involved in mining, the standard should change depending upon the location and specific operation of the mine in question. New Mexico’s system again presents clues to the most

96 See NWF, supra note 70.
workable solution. Under this system, mine operators must submit their own scientific analyses, which are then subject to review by government scientists. State regulators must take into account the unique geography and geology of a planned mine site, not just the design of the operation itself. A rigid legal framework is ill equipped to deal with the unique concerns of each individual mine. Instead, the system must be fluid, to deal with the myriad possible operational layouts and physical implications. Strong scientific oversight from government regulators will force mine operators to use the best available technology to avoid perpetual treatment in each specific case. A more concrete standard would inevitably leave some operations overregulated and some underregulated. Wisconsin’s shortsighted approach simply does not work; acid mine drainage will not be the same in Arctic Canada as it will be in northern Wisconsin. A flexible water quality standard, is a necessary factor in any mine closure planning system.

Under this standard, state agencies will inevitably refuse to permit some mines. However, this may be a necessary economic evil in today’s mining framework. If a mine cannot operate in a way that will avoid long-term environmental and financial problems, then it should not operate at all. Some commentators have analyzed trends in mining regulation and believe that this policy may very well be the future of the industry:

In reviewing how these issues have been addressed in the evolution of mining regulation, it becomes clear that precluding operations with predictable adverse hydrologic and geologic conditions, requiring financial assurance upon an early demonstration of long-term pollution problems, or requiring forms of financial assurances directed solely to long-term pollution may well be the outcome of the most recent efforts in developing consistent financial assurance requirements in the hardrock industry.\(^\text{97}\)

\(^{97}\) Gorton & Early, supra note 16 at §23.09 (emphasis added).
The mining industry will undoubtedly argue that any increased regulation might result in a complete shutdown of their livelihood, citing Wisconsin as an example. “The argument is that regulation can, and will, cause the costs of compliance to go far beyond the knee of the curve.”98 But industry has adapted to new regulations before, and Wisconsin is a unique outlier with a standard that is arguably impossible to achieve. A standard that is actually attainable with enough technological investment is another matter. New air pollution standards in the automobile industry did not spell the end for American car manufacturers.99 There will still be demand for minerals, and as the price increases, so will the incentive to develop new and cleaner technologies to meet regulatory standards.100 An increase in regulation will force companies to technologically evolve or perish. The probable result of this proposed policy is “that [mining] will continue only at increasing cost or at mining sites that are already operating.”101 But, “[b]ecause the world economy is still dependent on resources that can be obtained only through mining, a path allowing construction of mines will be found. Laying that path may be difficult, and it may come at a cost, but it is necessary.”102

V. Conclusion

Mining is integral to the history of the American west, and is a large part of today’s economy. The hundreds of abandoned mines across the region display the scars of irresponsible and unregulated mining. Beyond these early historic mines, newer

98 Smary, supra note 77 at 39.
100 “Mining disrupts things, but there's a value to it…every one of us uses 37,000 pounds of mineral product every year. [Companies] have no incentive to invest in technology to reduce environmental impacts because they don't have to.” Tarr, supra note 89.
101 Smary, supra note 77 at 40.
102 Id.
abandoned mines from the recent past have left a bevy of environmental and financial issues. Landscape destruction, acid mine drainage, and loss of aquatic life pervade the areas where mines once operated. With the operators of these mines long since defunct, the financial burden of attempting to remediate these sites falls to the government. There are systems in place to remedy this kind of failure in the future, but they are largely inadequate and do little to proactively guard against perpetual problems. Most of the current laws focus on ensuring payment for a cleanup of the mine after it is abandoned. Companies are required to post a financial bond, which is ostensibly used as insurance to clean up the mine in the event the company goes bankrupt. The issue with this system is that the methods of predicting future costs of remediation is nearly impossible, and the bond is often woefully inadequate to cover the actual bill. In order to protect against this system failure, better safeguards at the permitting stage are necessary.

States recognize this issue and have implemented a variety of regulatory regimes designed to prevent the problem from continuing. These state regulatory systems provide guidance and warning signals in the design of a new and more effective program. Wisconsin’s law is the bane of the mining industry, and no new mines have been permitted since 1998. New Mexico has seen some smaller mines open, and has not experienced the catastrophic failures on the scale of Summitville or Zortman-Landusky.

Using New Mexico’s law as a starting point, the relevant features of a successful mine permitting program come into focus. The backbone of any such program should be the denial of a permit to any operation that cannot prove, with some degree of certainty, that their operation will not require perpetual treatment after closure. Agencies must
maintain a flexible standard of review and allow scientific analysis on the particular aspects of each project. To use a single, one-size-fits-all standard is legally and scientifically untenable. The agency also must exercise effective oversight and enforcement of the regulatory structure, drawing increased revenue from mine permitting applications and fines. This type of regulatory regime ensures environmental protection in a potentially dangerous industry and allows economic growth through the permitting of responsible mining operations.