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Environmental Protection Agency
Office of Resource Conservation and Recovery
1200 Pennsylvania Ave. NW
Washington, D.C. 20460

Re: Comments on Financial Responsibility Requirements under CERCLA §108(b) for Classes of Facilities in the Hardrock Mining Industry
82 Fed Reg. 3388
Docket ID No.: EPA-HQ-SFUND-2015-0781

Submitted via http://www.regulations.gov

The American Exploration & Mining Association (AEMA) submits the following comments on the Environmental Protection Agency's (EPA) proposal to establish financial responsibility requirements for the hardrock mining industry under CERCLA §108(b).

AEMA (*formerly Northwest Mining Association*) is a 122-year old, 2,000-member national association representing the minerals industry with members residing in 42 U.S. states, seven Canadian provinces or territories, and 10 other countries. AEMA is the recognized national voice for exploration, the junior mining sector, and maintaining access to public lands, and represents the entire mining life cycle, from exploration to reclamation and closure. More than 80% of our members are small businesses or work for small businesses. Most of our members are individual citizens.

Executive Summary

EPA's CERCLA §108(b) Proposed Rule for hardrock mining and beneficiation is a classic "*solution in search of a problem*;" a problem that clearly does not exist. For the reasons set forth below, AEMA submits that EPA should withdraw the regulations in the Proposed Rule and issue a Final Rule concluding that no additional financial responsibility for hardrock mining pursuant to CERCLA §108(b) is required. EPA has failed to establish that the *degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances* for hardrock mining require a rule that imposes duplicative, onerous and economically devastating financial responsibility (FR) requirements. EPA has failed to recognize that federal land management agencies (FLMAs) and state mining regulatory programs reduce the *degree and duration of risk* to minimal levels, and their financial assurance (FA) programs ensure that there is no un-bonded or unfunded risk of Superfund liability.

EPA has failed to recognize that hardrock mining practices are significantly different today than in 1980 when CERCLA was enacted (*See* Appendix E, *REVIEW OF ENVIRONMENTAL PROTECTION AGENCY REPORTS, FINANCIAL RESPONSIBILITY RULES,* By the SOCIETY FOR MINING METALLURGY & EXPLORATION, INC., attached to the National Mining Association's [NMA's] comments). Over the past 35 years, mining practices have changed, engineering controls have been developed, plus federal and state regulatory programs and FA requirements have been adopted. Societal values have changed too, and industry became more aware of its impact on the environment.

The attached White Paper and exhibits (referenced hereinafter as "White Paper" and incorporated by reference), *HARDROCK MINING RECLAMATION AND REGULATION - DEVELOPING SUSTAINABLE ENVIRONMENTAL PROTECTION THROUGH CHANGING VALUES, CHANGING LAWS AND EXPERIENCE: A FEDERAL AND STATE REGULATORY SUCCESS STORY,* explains the evolutionary process from historic mining to today, where hardrock mines are designed, permitted, built and operated for closure. Prior to 1970, hardrock mines were typically designed and built to maximize production and minimize cost with little or no regard for environmental values. This was no different than other industries.

However, beginning in the 1980s almost all new hardrock mines have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard, and this is required by current federal and state law. At the same time, the FLMAs and States have significantly evolved their FA programs with specific emphasis on post-closure care and maintenance, thereby minimizing the long-term potential for releases of hazardous substances and un-bonded agency liability.

Throughout 2016, AEMA participated as a Small Entity Representative (SER) during the Small Business Advocacy Review (SBAR) Panel required by the Small Business Regulatory Enforcement Fairness Act (SBREFA) amendments to the Regulatory Flexibility Act. During this process, the FLMAs and state mine regulatory and FA programs demonstrated that their regulations contain enforceable regulatory mechanisms with FA that effectively address each of EPA's 13 response cost categories in the Proposed Rule.

The FLMA and State mine regulatory and FA programs coupled with engineering controls and best practices reduce the *degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances* to minimal levels and no additional FR requirements are necessary to protect the American taxpayer or the Superfund Trust Fund. These FLMA and state reclamation and closure requirements require more than reshaping land and revegetation. They require a mine to be designed, built, operated and closed to prevent the release of hazardous substances and ensure compliance with statutory and regulatory standards through the entire mine life cycle, including closure and post-closure.

Initially, when CERCLA was passed on December 11, 1980,[1] Congress directed the Executive Branch to implement FR requirements in accordance with the "*degree and duration of risk*" associated with the "production, transportation, treatment, storage or disposal of hazardous substances."[2] This congressional authority was tied directly to the level of risk and the necessity for federal regulation.[3] The President was granted discretion to implement these requirements, but required by Congress to 1) take into consideration the needs of the various industries for oversight and 2) consult with those who would provide financial backing for operations, to make sure appropriate funding would be available.[4] As demonstrated below, these two requirements have not been satisfied by the Proposed Rule.

Nevertheless, at the time CERCLA was enacted, the Executive Branch did not take action, nor did it take action after the SARA amendments were implemented in 1986. Similarly, EPA took no action after it was delegated authority in 1987 through Executive Order 12580.[5] In the decades that have passed since CERCLA was enacted, it has been primarily the FLMAs and individual States that have filled this void and satisfied the need for FR requirements for the hardrock mining industry.

As explained in the attached White Paper to this comment letter and cited above, the FLMAs and states have increased their oversight of mine permitting and reclamation practices, and they have developed comprehensive schemes covering all aspects of the mine permitting, reclamation and FA process. It is unusual that government and industry agree on environmental issues. In this case, however, industry, States, FLMAs, and the U.S. Small Business Administration (SBA) have had the same message to EPA in the CERCLA §108 (b) rulemaking--that existing FR programs are working at modern mines and there is no need for a costly and duplicative EPA program.

FLMA and State programs tie FA requirements to each mine's individual permit stipulations for operations and closure, and these requirements are reviewed and updated by the FLMA and/or State on a continual basis. EPA's Proposed Rule ignores these existing FLMA and State schemes and ignores the adverse effect that duplicative federal oversight would have on these states and their citizens. Instead of considering the present degree of risk and taking into consideration required input from FA providers, EPA's Proposed Rule is the result of litigious pressure from anti-mining environmental groups and special interests. Without regard to facts, EPA's Proposed Rule duplicates FLMA and state agency requirements, creates conflicts of law, and bypasses local administrative authorities who have proven expertise in reviewing, permitting, and overseeing mining projects.

In developing its Proposed Rule, EPA has ignored the fact that advances in engineering controls, technology, mining industry best practices, and FLMA and State regulatory programs have lowered the "*degree and duration of risk*" to a point that FR requirements pursuant to CERCLA

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[1] https://www.epa.gov/superfund/superfund-cercla-overview
[2] 42 USCA § 9608(b)(1)
[3] *Id.*
[4] *See* § 9608(b)(2).
[5] 52 FR 2923, 3, CFR, 1987 Comp., p. 193.

§108(b) for the hardrock mining industry are not required. Simply put, the EPA's Proposed Rule should not move forward because it exceeds the agency's authority under CERCLA; is unnecessary, duplicative, and conflicts with FLMA and State laws and regulations; relies on faulty, incomplete studies; and inappropriately targets the hardrock mining industry.

Had EPA proposed a CERCLA §108(b) rule for hardrock mining in the 1980s, the agency might have been able to make a case that such a rule was supported by the evidence. At that time, federal and state mine regulatory programs were still evolving (*See* White Paper), and limited FA was often required. Several western mining states did not have mining regulatory programs until the early 1990s.

Over the past 25 - 30 years, these programs have greatly advanced, adapted to new information and responded to fill gaps in both their regulatory and FA programs as circumstances have required. These programs have proven effective as the National Academy of Sciences, in response to a request from Congress, determined in a comprehensive 1999 report entitled *Hardrock Mining on Federal Lands.* The Report concluded that the overall structure of federal and state laws and regulations that provide mining related environmental protection is complicated, but generally effective. Furthermore, in 1999, BLM and USFS responded to a 2011 letter from Sen. Lisa Murkowski (R-AK) that combined, the two FLMAs had approved more than 3,300 mining plans of operation since 1990, and none of those have been added to the CERCLA National Priorities list.[6]

In the preamble to the Proposed Rule, EPA admits that CERCLA §108(b) FR may not be necessary: "*…there could be an associated risk that the rule will potentially require financial responsibility that may never be required.*[7]" This stunning admission demonstrates the Proposed Rule is arbitrary and capricious. There can be no justification for proposing such a costly rule that may never be needed. EPA's proposal to impose, at a minimum[8], a $7.1 billion superfluous CERCLA §108(b) FR program on the hardrock mining industry is completely untenable, especially in view of the minimal risk of unpermitted releases of hazardous substances.

Thus, the evidence is overwhelming that the CERCLA §108(b) mandate has been met by the FLMA and State regulatory and FA programs and no additional FR requirements pursuant CERCLA §108(b) are necessary to protect the federal Superfund program and the American taxpayer. The regulations in the Proposed Rule should be withdrawn and EPA should issue a Final Rule concluding that no additional FR requirements under CERCLA §108(b) are necessary for the hardrock mining industry.

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[6] The White Paper includes an analysis of EPA's National Priorities List (NPL) for Mining and Milling Sites (MMS) completed in April, 2015 by Richard DeLong, Enviroscientists, Inc. (now EM Strategies). DeLong's analysis revealed that there are over 1,100 sites on the NPL and EPA classifies 100 as MMS. However, only 55 of those sites are actual mining operations where a mineral was extracted from the earth. The other 45 are mineral processing facilities not associated with a hardrock mine. The 55 hardrock mine sites breakdown into the following temporal classifications: 49 are prior to 1970; 5 are from 1970-1990; and one, Barite Hill in SC is post 1990. The DeLong analysis is included with the White Paper and incorporated by reference.

[7] FR at 3463

[8] *See* Freeport-McMoRan comment letter dated May 5, 2017, at page 3, "a more representative value from EPA's regulatory impact analysis yields a figure of $15.7 billion."

I. CERCLA's Statutory Mandate has been met by the FLMAs and States' Mine Regulatory and FA Programs

CERCLA §108(b)(1) directly addresses the relationship of EPA's program to other Federal requirements. Specifically, Congress directed EPA to promulgate requirements for classes of facilities "***in addition to*** those under subtitle C of the Solid Waste Disposal Act [42 U.S.C.A. § 6921 et seq.] ***and other Federal law***[.]" 42 U.S.C. §9608(b)(1) (emphasis added). EPA claims to "read this provision in a most straightforward way: Requirements in this proposed rule are quite literally 'in addition to' whatever FR requirements may be imposed under other ***Federal laws for other purposes***." 82 Fed. Reg. 3402 (emphasis added). EPA further argues that the phrase "in addition to" provides no "limitation on the applicability of this section." *Id.* Consequently, under EPA's reading of the statute, "CERCLA §108(b) requirements apply even where a hardrock mine or mineral processor may be subject to, for example, Federal reclamation bonding requirements." *Id.* at 3402-3403.

Contrary to EPA's position, a plain language interpretation of the "in addition to" language in the statute expressly limits EPA's authority and prohibits the agency from duplicating FR requirements that are ***in place pursuant to the Resource Conservation and Recovery Act (RCRA)*** (previously referred to as the Solid Waste Disposal Act) or other Federal laws that share the same purpose, ***including federal reclamation bonding requirements***. The legislative history behind §108(b) supports this commonsense reading of the statute. Specifically, the Senate Report to CERCLA explained that "[i]t was not the intention of the Committee that operators of facilities covered by [RCRA FR requirements] be subject to two financial responsibility requirements ***for the same dangers***." S. Rep. No. 96-848, at 92 (1980) (emphasis added). Instead, CERCLA § 108(b) was intended to cover those facilities "who are ***not now covered by any*** [FR] requirements under [RCRA] section 3004(c)."[9] *Id.* (emphasis added).

While the statute and the legislative history call out RCRA FR requirements specifically, the phrase "other Federal law" clearly shows that Congress envisioned that duplication may also occur with other federal FR requirements and thus EPA should avoid duplicating these programs in a similar manner. Because EPA did not promulgate CERCLA §108(b) FR requirements in the 1980s as Congress directed, this phrase in the statute becomes even more central in interpreting EPA's appropriate regulatory role today as the federal regulatory landscape has substantially grown – particularly for the hardrock mining industry – to include other comprehensive programs that protect against the same risks that triggered Congressional action in the first place.[10]

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[9] *See also* United States Treasury, The Adequacy of Private Insurance Protection under Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980: A Report in Compliance with Section 301(b) of P.L. 96-510 (June 1983), at 72 ("[F]acilities already covered by the financial responsibility requirements of RCRA and other federal law are not yet again by Section 108.")

[10] EPA argues that "if Congress intended to insert limitations based on other Federal law into CERCLA, it clearly stated them as such." 82 Fed. Reg. 3402. This argument is also not convincing in this context. In 1980, there were few similar programs on the statutory books, with RCRA being the lead example. Congress could not have possibly predicted what other federal departments within the government would do in the future on this same subject matter. The phrase "other Federal programs" recognizes this basic reality. EPA's examples in other sections of CERCLA containing different limiting language are irrelevant to interpreting Section 108(b), which is clearly structured in a specific way to accomplish a purpose that would necessarily evolve over time. *See*

Thus, a plain reading of CERCLA §108(b) prohibits EPA from promulgating FR requirements for hardrock mines covered by FLMA FA. Congress recently reaffirmed this clear intent to avoid duplication in the Conference Committee Report attached to the Consolidated Appropriations Act of 2016 (Public Law 114-113): "Prior to proposing any rule pursuant to section 108(b) . . . the [EPA] Administrator is directed to . . . [include in an analysis] . . . the Agency's plan to avoid requiring financial assurances that are duplicative of those already required by other Federal agencies."

During the SBAR process, the FLMAs and four states made detailed presentations that revealed comprehensive regulatory and FA programs designed to prevent the release of hazardous substances and to provide FA in the event the operator is unable to complete reclamation and closure or take corrective action if and when necessary. These presentations demonstrated that all CERCLA §107 liabilities/obligations addressed by these programs are covered 100%. EPA failed to respond to the SERs and states on this point and has failed to explicitly identify any gaps in the FLMAs' and states' regulatory and FA programs that would justify a rule under CERCLA §108(b).

The six presentations revealed:

- Well-developed and thorough programs that review, permit, oversee, and establish FA for mines under their jurisdiction. These programs take into account the unique geology, geography, terrain, climate, mining methods, engineering controls and management practices attributable to individual mines that reduce the *degree and duration of risk* to appropriate or desirable levels.

- That the FLMAs and States' regulatory and FA programs for hardrock mining clearly cover the release of hazardous substances, provide FA for closure and post closure activities, and demonstrate the functional equivalent of a CERCLA §108(b) rule.

- That the only way a hardrock mining FA program can effectively work is if it is calculated on a site-specific basis. A nationwide FA program and/or a one-size-fits-all formula will not work. Therefore, EPA's proposed use of a general formula for all mines is arbitrary and capricious and contrary to the proven approaches used by other agencies with far more experience than EPA in regulating the hardrock mining industry.

- That in several States, different regulatory agencies cover different aspects of mining, milling and processing, but together they provide complete coverage. This inter-agency approach works. A review of some of the reports of State hardrock mining regulatory and FA programs prepared by EPA's contractor indicates that the contractor did not consider the effectiveness of such inter-agency approaches.

Comment from The Honorable Darryl L. DePriest, Chief Council, Office of Advocacy, SBA at 4 (EPA-HQ-SFUND-2015-0781-1406) ("When Congress enacted CERCLA in 1980, there were few financial assurance requirements in either state or Federal regulations, and what requirements existed were largely untested.").

- That the Bureau of Land Management (BLM), the U.S. Forest Service (USFS) and the States have the authority and regulatory tools to address unanticipated events at any time. They adapt to changing conditions or circumstances to prevent the release of hazardous substances. They have the authority to require plan and permit modifications and increase or reduce FA as needed. This is the principle of adaptive management that is ignored in EPA's Proposed Rule.

- The fact BLM holds almost $3 billion and the USFS holds almost $1 billion and the States hold comparably large FA amounts, in addition to the value of long-term trust funds, that thoroughly cover not only land reclamation and closure but also post-closure water management, treatment, and monitoring. EPA has not demonstrated how these monies would not be sufficient to address any hazardous substance releases at currently operating or proposed mines.

- That a CERCLA §108(b) rule would be duplicative and completely overlap existing FLMA and State FA programs.

- That the expertise and experience to calculate FA for hardrock mines resides with the States and the FLMAs, and that EPA lacks this experience and expertise. The States and FLMAs have been calculating FA on a site-by-site basis for more than 25 years.

- That operators, in cooperation with the FLMAs and States, are in the best position to prevent the release of hazardous substances and to ensure adequate FA to protect the taxpayer.

- That a nationwide, one-size-fits-all FR standard is unworkable. It would be inappropriate, arbitrary and capricious to calculate FR at one site based on data from another site. There is no environmental support for a one-size-fits-all formula. It would be arbitrary to apply credits applicable at one site to a different site.

- That neither the FLMAs nor the States see any basis for EPA moving forward with CERCLA §108(b) regulations.

It is clear there would be substantial if not complete overlap between the FLMA and State programs and an EPA CERCLA §108(b) program based on the information provided by EPA, the FLMAs and States during the SBAR process. EPA's Proposed Rule reveals that it would completely duplicate existing programs. Contrary to EPA's position that CERCLA §108(b) regulations are significantly different as compared to existing Federal and State requirements for hardrock mining facilities, the FLMA and State regulatory and FA requirements ensure not only permit compliance, they also reduce the *degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances* to minimal levels, and require sufficient FA to protect the U.S. taxpayer and the Superfund Trust Fund. There is nothing left for EPA to cover.

Given the comprehensive and robust hardrock mining regulatory and FA programs of the FLMAs and States, the burden is on EPA to show where and how a CERCLA §108(b) rule would not duplicate or preempt the State and FLMA programs. EPA must identify any gaps in the States' and FLMAs' hardrock mining regulatory and FA programs that would justify a CERCLA §108(b) FR rule. For the Proposed Rule, EPA has not identified any such gaps in existing programs and, as the record clearly indicates, EPA has not justified the proposed requirements.

When the SERs asked EPA to provide any site-specific example at active or proposed mining operations where a plausible hazardous release could occur that would not be addressed by existing programs, EPA could not do so. Instead, EPA has relied extensively on releases and clean-up actions at historic operations that do not represent current practice. The fact that such releases have not occurred and no Superfund liability has been generated over the past decade further places the burden on EPA to demonstrate why a new national program is required.

EPA's analysis of State regulatory and FA programs is woefully inadequate. This is demonstrated by the comprehensive analysis of State programs, *Review of State Financial Responsibility Requirements for Hardrock Mines and the Response Categories in EPA's CERCLA § 108(b) Proposed Rule,* prepared by Debra Struhsacker and SRK Consulting for NMA and attached to NMA's comments as Appendix A (AEMA incorporates this report by reference). The Struhsacker-SRK analysis clearly demonstrates there are no gaps and a CERCLA §108(b) FR rule would duplicate, and therefore preempt state programs pursuant to CERCLA §114(d). Again, EPA has failed to demonstrate where any specific State program could reasonably be judged to not provide adequate FA at specific sites.

EPA fails to recognize that establishment of appropriate FA requirements for a modern mining operation is a thorough, exhaustive, and facility- and site-specific process. Before even considering whether State FA requirements are adequate, EPA must first define the potential for uncontrolled releases that could trigger the need to access FA.

As a basic fact, mining companies generally work to design projects that minimize the potential for hazardous substance releases during operations and after closure. Mining companies rely on extensive in-house technical experts as well as outside consultants to select state-of-the-art practices to minimize risk, including in the fields of geotechnical and civil engineering, processing, hydrology and hydrogeology, and geochemistry among others. Moreover, such expertise is often specific to a particular region and certain climactic conditions. For example, tailings, waste rock, and leach facility design in remote areas of western Alaska is not comparable to design in the arid Southwest.

As indicated above, facility design is focused on not only operations, but also long-term closure and post-closure conditions. Overseeing the industry's work are experienced Federal and State agency mining program staff that review and permit projects. These agency staff, supplemented by expert consultants, bring similar expertise in ensuring that mines prevent hazardous substance releases during operations and after closure. The application of such specific industry and agency

expertise and technical knowledge has been directly responsible for the total lack of any releases at modern mining operations that have led to Superfund liability in the past decade.
In the Proposed Rule, EPA has established uniform national FA requirements and performance standards that run contrary to the currently successful site-specific approach. With all due respect to EPA, its Headquarters' staff and consultants do not have anywhere comparable technical or practicable experience in establishing or applying such standards. This point was emphasized in the Western Governors' Association Policy Resolution 2014-07, *Bonding for Mine Reclamation*:

> 2. Western states have a proven track record in regulating mine reclamation in the modern era – including for hard rock mines -- having developed appropriate statutory and regulatory controls, and are dedicating resources and staff to ensure responsible industry oversight.
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> 3. In contrast, EPA currently has no staff dedicated to oversight of mine reclamation, or to the approval of bonding associated with mine reclamation. As a consequence, if EPA proceeds to promulgate bonding requirements for the hard-rock mining industry under CERCLA Sec. 108, it will have to create a new federal regulatory program -- an unnecessary investment of federal funds -- at a time when the federal government is trying to get its fiscal house in order.

In addition, EPA Headquarters intentionally chose not to consult with FLMAs, other Federal Agencies, State, and industry experts in determining performance standards. During the SBAR process, the SERs repeatedly requested that EPA staff visit mine sites throughout the U.S. to understand how existing programs work. EPA refused these invitations citing lack of time despite the fact work on the Proposed Rule had been ongoing for more than five years. As a direct result of EPA's decision to develop the Proposed Rule in a vacuum, EPA fails to provide any examples of where the uniform national performance standards minimize future liability risk. Additional comments on EPA's performance standards are provided later in this letter.

Existing FLMA and State FA programs are constantly being improved as the regulatory agencies and industry gain experience. This continuous improvement approach is a key element in these programs and is responsible for the significant increases in the FA amounts required by State and FLMAs over the last 25 years. The FLMA and State programs typically require updates to plans of operation and FA calculations on a periodic basis or more frequently when facility modifications are proposed. For example, the BLM reviews the "*amount and terms of the financial guarantee for each increment of your operations at least annually*"[11] or sooner if there is a modification to the plan of operation or the agency determines a need. The USFS Training Guide for Reclamation Bond Estimation and Administration states *"[T]o ensure the bond can be adjusted as needed to reflect the actual cost of reclamation, the FS should include provisions allowing for the periodic adjustment of bonds in the Plan of Operation prior to approval."*

In Nevada, each FA cost estimate must be updated at least every three years or any time a change is proposed. The fluid management permit program administered by Nevada requires permit

[11] 43 CFR §3809.553(b)

renewals every five years, which also triggers an update to the FA. As a specific permit condition for all large, hardrock operations in Alaska, mines must undergo a comprehensive third-party environmental audit, under State direction, every five years. These audits specifically include detailed review, and as needed, update of the mines' FA requirements. The review reports are posted on the Alaska Department of Natural Resources (ADNR) website, see http://dnr.alaska.gov/mlw/mining/largemine. Although specific timeframes for permit or FA updates are not included in all of FLMA and State programs, it is common practice that mine plans will change on a regular basis and each of these changes triggers a review and update of all permit conditions, including the FA calculations.

As noted above and in the attached White Paper, as well as in Appendix E attached to NMA's comments, EPA erroneously assumes that currently permitted and authorized to operate mines are operated in a manner similar to those that have become CERCLA sites. This assumption ignores the scope of the state and FLMA programs under which today's mines are required to operate. The FLMA and state mine regulatory and FA programs are specifically designed to ensure that mines are designed, constructed, operated and closed in a manner that avoids the types of problems that were caused by practices implemented by unregulated or under-regulated mines of the past.

EPA's CERCLA §108(b) rulemaking for hardrock mining and beneficiation is a classic "*solution in search of a problem*;" a problem that clearly does not exist. The hardrock mining States and FLMAs have comprehensive, robust regulatory programs in place that address FA requirements associated with mining and beneficiation, reclamation, closure and post-closure. The entire mining life-cycle is covered. Monitoring and regular inspections are part of these regulatory programs to ensure that FA is always kept current. These programs substantially reduce the risk of a release, and the current regulatory framework, including permits, monitoring, reporting and corrective action, assure that when releases do occur, they are promptly identified, reported and addressed under the supervision of regulatory authorities. EPA has placed several documents in the rulemaking record that reflect releases, but these reports are misleading because they overlook or fail to report the responses to the releases (*See* discussion on page 20.

The States and FLMAs have the expertise and staff to calculate the appropriate amount of FA based on unique site-specific circumstances and features (e.g., geochemistry), for each mining operation and to adjust FA as required over the life of the operation, including post-closure. These programs are designed to prevent the release of hazardous substances and ensure that sufficient FA is in place to ensure that the costs of taking remedial action do not fall to the federal Superfund program or the American taxpayers in the event of bankruptcy or an event that requires corrective action.

The fact no hardrock mining or beneficiation plan of operation approved by BLM or USFS since 1990 has been added to the CERCLA NPL demonstrates that the "*degree and duration of risk*" for hardrock mining is too small to regulate, thereby satisfying CERCLA §108(b)'s statutory mandate and EPA does not need to propose a national program. Because the existing FLMA and State programs cover CERCLA §107 liabilities, there is minimal to no benefit to the public or

the environment from a CERCLA §108(b) rule and significant regulatory burdens and costs on the industry, especially small entities. EPA has failed to demonstrate otherwise.

The Proposed Rule is an ill-advised proposal that imposes an enormous and unjustifiable burden on the U.S. hardrock mining industry because it duplicates existing state and federal FA requirements[12] for mine operators and provides little to no environmental benefit. Because existing State and federal FA programs[13] already require mine operators to provide substantial FA for their operations to ensure that mines are reclaimed and closed in a manner that protects the environment and shields taxpayers from exposure to future cleanup costs at today's mines, adding a superfluous layer of EPA FR is unwarranted. EPA should withdraw the regulations in the Proposed Rule and develop a Final Rule that establishes there is no need for another federal FR program for the hardrock mining industry.

Because EPA must provide "notice of its final action" by December 1, 2017 to satisfy a court-ordered deadline,[14] there is urgency for EPA to withdraw the regulations in the Proposed Rule and focus its attention upon developing a Final Rule that concludes that no additional FR is required for the hardrock mining industry and CERCLA §108(b)'s mandate has been satisfied.

The potential negative economic impacts of the Proposed Rule are a stark contrast to EPA's own estimate of the benefits to the American taxpayer - a meager $15.5 million each year. AEMA further contends that this estimate is actually an overestimate of the benefits since EPA has failed to provide a single example of currently operating mines where there is a risk of a hazardous substance release that could create substantive Federal Superfund liability. It is completely unclear how establishing extremely burdensome and highly duplicative program is justified given the very small projected benefits.

The Small Business Administration's Office of Advocacy's (Advocacy), comment letter (attached to these comments and incorporated by reference), provides further support for AEMA's position that the Proposed Rule is highly flawed, duplicative and burdensome. *See,* section 1 beginning on page 4 and section 3 beginning on page 8.

In summary, EPA will create at least an estimated $7.1 billion FA obligation for hardrock mining companies with no guarantee of instrument availability (see discussion in Section VII, *supra* on market capacity) – on top of them more than $3.5 billion of FA the industry already provides to the FLMAs and billions of dollars of additional FA provided to States.[15]

Finally, it is noteworthy that EPA indicated they did not adopt a site-specific approach to determining hazardous substance risk because it does not have the resources or capability to do

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[12] Also known as "bonding requirements."
[13] Two federal land management agencies ("FLMA"), the U.S. Bureau of Land Management ("BLM") and the U.S. Forest Service ("USFS") already have substantial FA requirements for hardrock mines.
[14] EPA must comply with the January 29, 2016 Order of the U.S. Court of Appeals for the District of Columbia in re: *Idaho Conservation League et al* No. 14-1149 ("Court Order"). The Order states, in part, "Although more is required with respect to hardrock mining than the other identified industries, where EPA retains discretion not to conduct a rulemaking at all, *EPA retains "discretion to promulgate a rule or decline to do so" even for the hardrock mining industry."* Order at p. 3 (emphasis added).
[15] As examples, Nevada regulators alone have $2.66 billion in FA; while Alaska's program currently maintains $844 million.

so. This is despite the fact the FLMAs and States are already doing so effectively. However, EPA contradicts its own approach in its proposed method for reducing or releasing FR. The Proposed rule provides that EPA Regional Administrators would determine, on a site-specific basis, when the reductions in risk merit partial or full release. Since there is no uniform methodology proposed for such releases or reductions, relying instead on each Region to determine the methodologies, and, as EPA acknowledges, because it does not have the resources to make such determinations, mining companies will not be able to assume any reasonable timeframe for releases or reductions and they will have to account for the FA requirements for an indefinite period. There is no reasonable basis for this requirement since the FLMAs and States are far more qualified, and they already do, make such determinations.

II. The Proposed Rule Qualifies for Elimination Pursuant to EO 13777 because CERCLA §108(b) FA is Duplicative, Burdensome, and EPA's Involvement is Unwarranted

A. EPA's Faulty Premise that CERCLA §108(b) Covers Something Different than Existing State and Federal FA Requirements Undermines the Need for the Rule

EPA's Proposed Rule to require FR for the hardrock mining industry is based on the faulty premise that CERCLA §108(b) FR would address environmental risks that differ from the environmental risks that existing State and FLMA FA programs already cover. The rulemaking record for the Proposed Rule clearly demonstrates the specious nature of EPA's position, which is internally inconsistent and based on faulty logic.

This record shows that today's hardrock mines are highly regulated and have robust FA as required under state and/or FLMA programs, and state and federal regulators have sufficient FA resources to respond to unpermitted future releases of hazardous substances from a hardrock mine in the event the owner fails to do so. EPA's Proposed Rule would create a superfluous FR program and cause unwarranted and unsupportable financial hardship for the hardrock mining industry and should thus be withdrawn in accordance with EO 13777.

EPA's assertion that CERCLA §108(b) covers something different than existing State and FLMA FA is based on a distinction without a difference. The State and FLMA FA programs fully address the exact same types of environmental risks and cover the identical mine features and on-site activities as the following thirteen Response Cost Categories that EPA developed in §320.63 of the Proposed Rule:

CERCLA §108(b) Proposed Rule Response Cost Categories:

- Solid/hazardous waste disposal
- Open pit
- Waste rock
- Heap/dump leach
- Tailings facility
- Process pond/reservoir

- Underground mine
- Slag pile
- Drainage
- Interim O & M
- Water Treatment
- Short-term O & M/Monitoring
- Long-term O & M/Monitoring

EPA's incorrect assertion that CERCLA §108(b) covers something different than existing State and FLMA FA programs blatantly contradicts EPA's simultaneous use of these supposedly different State and federal programs in two fundamental ways to determine program requirements. First, EPA uses existing FA requirements as the basis for calculating how much FR should be required for each category. Second, EPA proposes to allow coverage under these FLMA and State programs to reduce or eliminate CERCLA §108(b) FR obligations. *See,* for example, §320.63(c) of the Proposed Rule, which states:

> *Owners and operators may satisfy requirements of [the response components in] paragraph (b)(i) through (xiii), in whole or in part, by demonstrating that they are subject to, and in compliance with, requirements that will result in a minimum degree and duration of risk associated with the production, transportation, treatment, storage, or disposal, as applicable, of all hazardous substances present at that site feature. A demonstration under this paragraph will reduce the amount of financial responsibility that an owner and operator must demonstrate under this part.*

EPA's wholesale reliance on the environmental protection regulatory requirements and best management practices used at today's mines to determine and reduce or eliminate CERCLA §108(b) FR requirements renders the Proposed Rule internally inconsistent. EPA cannot have it both ways. The Agency cannot claim that existing state and federal reclamation and closure bonding programs cover something different than CERCLA §108(b) and simultaneously reverse this position by relying on these so-called "different programs" to satisfy FR requirements in the Proposed Rule.

EPA's contradictory position completely undermines EPA's premise for the Proposed Rule and proves that imposition of CERCLA §108(b) FR would duplicate the States' and FLMA's existing FA programs. The proposed duplication directly conflicts with EO 13777 as well as President Clinton's EO 12866 and President Obama's EO 13563. The proposed duplicative FR requirement places an enormous and unnecessary regulatory burden upon the hardrock mining industry, which also violates key objectives in EO 13777.

Advocacy's comment letter urges EPA to withdraw the Proposed Rule because EPA has not demonstrated any necessity for the Proposed Rule or justification for the economic hardships it would create:

> *The agency [EPA] has conspicuously failed to articulate a cohesive response to the argument that state and Federal rules address the same risks comprehensively.* (Advocacy letter at 3).
>
> *Although EPA states that these mining regulations are "distinct" from the CERCLA §108(b) requirements, this does not mean that the Federal and state mining requirements do not address the same response categories using other legal authorities and different language. An entirely duplicative CERCLA §108(b) financial responsibility program would be inconsistent with the "degree and duration" of risk associated with potential releases from current highly regulated and fully bonded hardrock mines. EPA is proposing an additive regulatory scheme in the absence of a clearly articulated need as to why these existing programs are deficient or require additional FA.* (Advocacy Letter at 5).
>
> *Advocacy strongly recommends that EPA withdraw this ill-advised proposal,* [which is] *without evidence that a problem exists warranting intervention... There is no statutory need for this regulation, nor are there any significant environmental benefits demonstrated by EPA... EPA is proposing a rule that would cost the industry $171 million annually for an annual savings to the government of $15.5 million by its own estimate, to address risks that are already addressed by state and Federal agencies.* (Advocacy Letter at 1 and 3).

Advocacy's January 2017 letter provides compelling reasons to withdraw the regulations in the Proposed Rule that also are consistent with the objectives in EO 13777. In compliance with the EO 13777 policy to eliminate unduly burdensome regulations, EPA must heed Advocacy's advice and withdraw this fatally flawed Proposed Rule, which is built on a defective and illogical foundation.

In light of the rulemaking record including comments filed on or before July 11, 2017 and EO 13777, EPA must write a Final Rule that reflects "adequate evidence has been demonstrated," and that there is no need for additional CERCLA §108(b) FR. The Final Rule should establish that there is no difference in the coverage provided by the existing States' and FLMAs' FA programs and the coverage in the Proposed Rule. Consequently, there is no demonstrated need for the regulations in EPA's Proposed Rule. Because EPA's rulemaking process has gathered substantial evidence of adequate FA to address potential future unpermitted releases of hazardous substances from hardrock mines, EPA has fulfilled the CERCLA §108(b)(1) statutory mandate to "establish and maintain evidence of financial responsibility." EPA should withdraw the regulations in the Proposed Rule and issue a Final rule that no additional FR pursuant to CERCLA §108(b) is required.

B. <u>The Proposed Rule Should be Withdrawn Because There is No Degree or Duration of Risk that Warrants the Rule's Regulatory Burden</u>

The Congressional directive in CERCLA §108(b) requires EPA to develop requirements for classes of facilities "to establish and maintain evidence of financial responsibility *consistent with*

the degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances." (emphasis added). Consequently, the threshold question in evaluating the need for the Proposed Rule should focus on whether there is a substantial degree of unfunded risk associated with the hardrock mining industry and if so, what is the duration of that risk.

The rulemaking record for the Proposed Rule provides overwhelming evidence that the existing State and FLMA environmental protection rules and FA requirements for hardrock mining reduce risks to a very low level. Because there is minimal risk, the issue of the duration of the risk is nullified. As a result of the States' and FLMAs' regulations and FA requirements already governing hardrock mines and the resulting elimination of substantial or long-term risks associated with today's mines, there is no need for a CERCLA §108(b) FR Rule that applies to hardrock mines. The Final Rule must reflect this finding and establish that CERCLA §108(b) FR is not warranted. The rulemaking record, mining industry comments and the prohibition in EO 13777 against costly, outdated and unnecessary regulations that cost jobs and interfere with regulatory reform objectives mandate this outcome.

Because the States and FLMAs generally require FA for each of the thirteen CERCLA response categories for mine site features and mine site activities listed in Section II A, there are no un-bonded risks associated with today's mines. Consequently, there is minimal risk that operating hardrock mines will cause natural resource damage or adversely impact human health. Thus, there is no need for the Natural Resource Damages or Health Assessment cost categories included in the Proposed Rule.

Advocacy's January 2017 letter tells EPA there is no need for the regulations in the Proposed Rule because of the minimal level of risk associated with modern mines:

> *In sum, there is little evidence of a need for the proposed CERCLA §108(b) bonding program which EPA estimates to involve tens of billions of dollars. EPA's scheme would only potentially be justified if modern mines were facing the same type of remedial costs as previous legacy sites that did generate billions of dollars of costs. This rulemaking is not required by statute because the risk is minimal.* (Advocacy letter at 4).
>
> *The historical record does not support a determination of risk levels requiring new Federal involvement, especially when EPA has not refuted the assertion that certain regulatory programs provide coverage of the same response actions that EPA plans to cover (e.g., state and Federal mining regulations).* (Advocacy letter at 17)
>
> *EPA simply describes evidence of recent releases, while not addressing the fact that the responses to these releases are potentially being handled effectively under the existing regulations. If other Federal and state programs adequately handle these releases, this would undermine, rather than support the foundation for this proposal.* (Advocacy letter at 7).

The evidence presented to the SBAR Panel, these and other mining industry comments, and compliance with EO 13777 require EPA to withdraw the unnecessary regulations in the Proposed Rule. Proceeding with the Proposed Rule would be arbitrary and capricious and violate each of the regulatory directives in EO 13777.

C. There is No Gap - CERCLA §108(b) FR Duplicates Existing FLMA and state FA Requirements and is thus Inconsistent with Congressional Intent and EO 13777

During the SBAR Panel convened in conjunction with the CERCLA §108(b) rulemaking, numerous SERs, state regulators, and the FLMAs provided substantial evidence that state and federal FA programs include comprehensive FA that covers reclamation, closure, and releases of hazardous substances. Advocacy's January 2017 letter to EPA cites input from the SERs that emphasizes this point:

> *The hardrock mining states and the federal land management agencies have comprehensive, robust regulatory programs in place that address FA requirements associated with mining and beneficiation, reclamation closure and post-closure issues. These programs substantially reduce, if not eliminate, the risk that a mine will have a release of hazardous substances... The FLMA's and state's comprehensive, robust regulatory programs are designed to prevent the release of hazardous substances and assure sufficient FA is in place to protect the taxpayer in the event of bankruptcy or an event that requires corrective action.*
>
> *EPA appears to hold the position that somehow the existing federal and state FA programs deal solely with traditional reclamation and mine closure activities (e.g., recontouring and revegetating disturbed areas). This position is incorrect. The existing regulatory requirements for hardrock mining go far beyond reclamation and closure and include many provisions designed to protect the environment. Consequently, they include measures to prevent releases of contaminants from operating and closed mines that would come under the CERCLA 107 hazardous substances definition.* (Advocacy letter at 5 – 6).

Throughout the CERCLA §108(b) rulemaking, EPA has not pointed to any shortcomings or gaps in any of the State or FLMA FA programs. To the contrary, EPA's reliance on existing State and FLMA FA to form the basis for FA amounts for each response category, and reduce or eliminate the need for CERCLA §108(b) FA, indicates EPA places sufficient confidence in these existing FA programs to determine that they supplant the need for CERCLA §108(b) FR.

The December 2016 SBAR Panel Report published by EPA, Advocacy, and the Office of Management and Budget/Office of Information and Regulatory Affairs ("OMB") states that the CERCLA §108(b) FR program is designed to: "...fill the gap where other regulations fail to prevent releases or threatened releases of hazardous substances"[16] (SBAR Panel Report at 9) but

[16] Final Report of the Small Business Advocacy Review Panel on EPA's Planned Proposed Rule, Financial Responsibility Requirements for the Hardrock Mining Industry Under CERCLA § 108(b), December 1, 2016.

EPA has not pinpointed any gaps that need to be filled. EPA is thus making an unsubstantiated claim that the States' and FLMAs' FA programs are different, inadequate, or both without providing any explanation whatsoever of why the States' and FLMAs' FA programs do not address the same types of releases of hazardous substances as those the Proposed Rule purports to cover.

Appendix A[17] of the SBAR Panel Report is a lengthy table prepared by one of the SERs that lists the CERCLA Response Categories in the Proposed Rule and shows that the FA requirements for mines in Nevada and on BLM-administered federal lands provide complete FA for the mine features and activities that are identical to EPA's Response Cost Categories[18]. Advocacy's January 2017 letter states that an analogous table can be produced documenting FA covering the CERCLA Response Cost Categories for mines on National Forest System lands administered by the USFS. (Advocacy letter at 6). The obvious redundancy of the Proposed Rule, which is shown so clearly in this table, proves this rule is unnecessary.

In its January 2017 letter to EPA, Advocacy found that the Proposed Rule would duplicate the existing states' and FLMA's regulatory and FA requirements:

> *Both BLM and USFS have effective and comprehensive FA requirements that extend far beyond reclamation (i.e., earthworks and revegetation) and can include long-term FA for sites where warranted... The Federal Land Management Agencies (FLMA) and state agencies have existing comprehensive bonding and regulatory requirements that would be duplicated by every response requirement that EPA intends to address under CERCLA §108(b).* (Advocacy letter at 5).

EPA's failure to demonstrate any gaps or problems with the existing States' and FLMA's FA programs means EPA has not shown there is a need for the Proposed Rule and cannot justify the enormous costs associated with the Proposed Rule. Consequently, EPA must withdraw the regulations in the Proposed Rule, and develop a Final Rule that establishes that there is no requirement for additional FR pursuant to CERCLA §108(b) for the hardrock mining industry.

As a result of the rulemaking for the Proposed Rule and the SBAR Panel process, EPA has conclusive "*evidence of financial responsibility consistent with the degree and duration of risk associated with the production, transportation, treatment, storage or disposal of hazardous substances*" as mandated by CERCLA §108(b)(1). Because there is overwhelming evidence that the States and FLMAs already have FA for hardrock mines that is sufficient to address future releases of hazardous substances, promulgation of a Final Rule requiring additional FR pursuant to CERCLA §108(b) would be arbitrary and capricious, and conflict with EO 13777.

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[17] Appendix A from the SBAR Panel Report is included herein as Appendix B.
[18] Nevada, BLM, U.S. Forest Service, and other states use the Standardized Reclamation Cost Estimator ("SRCE") software to calculate reclamation costs that uses detailed site-specific factors and engineering cost estimates.

III. The Costs of the Proposed Rule Far Outweigh the Benefits

As clearly articulated in Advocacy's January 2017 letter, there is essentially no financial benefit associated with the Proposed Rule, which EPA projects will cost the hardrock mining industry between $111 to 171 million each year – and save the federal government $527 million over 34 years – only $15.5 million per year. As indicated above, and in Section VII below regarding market capacity, the cost is likely underestimated while the benefit is likely overestimated. Obviously, there is no meaningful public or environmental benefit associated with the Proposed Rule – which costs so much and accomplishes so little.

In addition to the economic hardships the Proposed Rule would impose on the mining industry, it would also create adverse socioeconomic impacts in mining states where mining jobs will be lost due to the premature closure of mines that cannot withstand the added FA burden. Our Nation's reliance on foreign sources of strategic and critical minerals necessary for national defense, manufacturing, infrastructure, and the everyday products of modern society will increase dramatically, putting America at risk.

Advocacy's letter critiques EPA's cost benefit analysis saying that EPA has grossly overestimated the rule's benefits. Advocacy found that EPA has overestimated the number of bankrupt companies that will incur a CERCLA response cost, has inflated EPA's response costs, and has assumed that CERCLA §108(b) FR will be used to fund a response at too many sites:

> *Based on [Advocacy's] conservative estimates, the estimated benefits of Option 1 of EPA's proposed rule in terms of reduced Government Costs would drop from EPA's $527 million estimate to $13.2 million [over a 34-year period]. When compared to 34 years of EPA's estimate of Option 1 annual FA responsibility expenditures ($171 million/year), the cost/benefit ratio demonstrates the huge inefficiency of EPA's regulatory approach... This comparison is just another way to appreciate the inappropriateness of this proposal, even if one ignores the flaws in the formula methodology. The EPA scheme, in effect, is a huge transfer between mining firms and the FA industry with comparatively small benefits to the public.* (Advocacy letter at 16).

> *EPA is proposing a rule that would cost $171 million annually by its own estimate, to address risks that are already addressed by state and Federal agencies. Given the minimal remaining risks, the statute does not require any regulation under CERCLA 108(b) to address the hardrock mining industry. EPA also greatly overstates the benefits of this rulemaking by failing to incorporate valid estimates of the incremental impact of the proposed rule. When properly evaluated, the costs of the proposed action far outweigh the benefits.* (Advocacy letter at 17).

In the preamble to the Proposed Rule, EPA admits that CERCLA §108(b) FR may not be necessary: "*...there could be an associated risk that the rule will potentially require financial*

responsibility that may never be required.[19]" This stunning admission demonstrates the Proposed Rule is arbitrary and capricious; there can be no justification for proposing such a costly rule that may never be needed. EPA's proposal to impose, at a minimum[20], a $7.1 billion superfluous CERCLA §108(b) FR program on the hardrock mining industry is completely untenable. The arbitrary and capricious nature of this unnecessary rule are compelling reasons why EPA must withdraw the regulations in the Proposed Rule and issue a Final Rule that finds there is no justification for proceeding with the Proposed Rule. The Final Rule should establish that there are no meaningful public or environmental benefits associated with the Proposed Rule, the estimated costs to the mining industry are not justifiable, and the loss of mining jobs and adverse socioeconomic impacts are unacceptable.

IV. The Proposed Rule is EPA's Attempt to Become the "Super Regulator" of Hardrock Mining

To address largely hypothetical risks, the Proposed Rule would impose extraordinary financial burdens that almost entirely duplicate similar measures already in place. Worse still, because of EPA's own lack of capacity, the best EPA could do in the Proposed Rule was to adopt a crude, one-size-fits-all formula that wholly ignores dramatically different site-specific circumstances among mining operations, yielding truly extraordinary (and unnecessary) sums of FR to be required. Indeed, EPA did not merely ignore site-specific conditions in determining its preferred methods of reclamation/remediation and control of hazardous substances at particular sites, it explicitly disavowed any intention, or even the capacity, to conduct any site-specific analysis.

Rather than consider whether, in light of this admitted lack of capacity, it might be prudent not to act, EPA instead developed its own generic formula for calculating mine FR requirements from whole cloth. This superficial approach uses a very small number of parameters, ignores many highly relevant site-specific conditions, and then assigns an estimated cost for each mine by scaling EPA's estimates for those individual features (such as tailings facilities, open pits, waste rock facilities and process ponds) to the sizes of currently operating facilities.

It is illustrative to evaluate this approach compared to the methodologies used by the FLMAs and States that have been developed over time. These government agencies consistently have shown that FA should be calculated on a region-by-region, site-by-site basis. They base their approaches on many years of regulating the mining industry and ensuring that adequate FA is available to prevent and address releases. It is clear that EPA staff brought no such experience to determine the methods for FR determinations in the Proposed Rule. In setting these FR amounts, EPA also made the astonishing and unjustifiable assumption that *every one of those features/categories* will require a CERCLA response *at every mine site* as the basis for establishing an extraordinarily large pool of contingency funds. No qualified mining expert would find EPA's conclusion justified from a technical perspective, and the administrative

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[19] FR at 3463

[20] *See* Freeport-McMoRan comment letter dated May 5, 2017, at page 3, "a more representative value from EPA's regulatory impact analysis yields a figure of $15.7 billion.

record developed in support of the Proposed Rule contains nothing to justify such unreasonable assumptions.

Faced with the excessive financial responsibility requirements of the Proposed Rule, many mines, and perhaps most, will be forced to qualify for EPA's crediting program or face going out of business. This will involve compliance with the technical performance standards provided for each response category. Again, mining companies generally design their operations to minimize the potential for releases and risks to the environment. The FLMAs and States then utilize their expertise to determine the adequacy and potential risks of specific designs. In many cases, technical requirements are established in FLMA and State regulatory programs. However, based on experience, there is a general recognition that a "one size fits all" approach does not work. Specific examples of the inappropriate elements of EPA's proposed performance standards include:

- *For open pit categories, EPA proposes that structures that are considered to be critical structures to be designed for a long-term static factor of safety of 1.5 or greater, structures that are considered to be non-critical structures to be designed for a long-term static factor of safety of 1.3 or greater, units being closed be designed for a factor of safety of 1.1 or greater under pseudostatic analysis.*

  Many government agencies have chosen not to define specific safety-factors allowing such determinations to be made a on site-specific basis. Moreover, in a large pit, it is highly relevant whether such a requirement would apply across the entire pit or in small, localized areas. Exact determinations of appropriate post-closure stability requirements are often made as data are collected when pits are operational – balancing the need for stability with mining economics. For EPA to usurp the authority of existing programs without any practicable knowledge or experience in open pit design or any clear evidence that this requirement is needed beyond existing programs to minimize risk, is arbitrary, capricious, and without merit. Moreover, it interferes with mining companies' abilities to determine how best to economically mine a deposit. Note this comment also applies to the stability requirements for the waste rock and heap leach response categories.

- *For waste rock category, for existing units, the plan must provide for permanent stormwater conveyances, ditches, channels and diversions designed to convey the peak flow and ponds and other collection devices designed to store the volume generated during a 24-hour period by a 100-year return interval storm event. For units that become authorized to operate after [insert the effective date of the Final Rule], the plan must provide for controls designed to store the volume generated during a 24-hour period by a 200-year return interval storm event... In addition, a plan for the minimization, prevention, or collection and treatment of discharges and/or seepage, based on site hydrology and water quality characterization information, that provides for a cover system of, at a minimum, a store and release earthen cover system with a thickness of at least twelve inches and, if necessary, additional source controls or capture and treatment at closure, all of which meet a minimum 200-year life design criteria.*

  Here again, EPA has proclaimed its view of appropriate cover and water management system designs without indicating why existing programs are inadequate to address risk.

Mining companies, under the oversight of FLMAs and States establish site-specific closure designs for waste rock facilities based on local geochemistry, hydrology, hydrogeology, and geotechnical conditions and the surrounding environmental that could be impacted. There is absolutely no basis for setting rigid national standards or design criteria for water management and cover systems where facilities have site-specific water management plans and associated FA that are protective. EPA has not made any compelling argument why such local, site-specific closure requirement determinations are not working to justify why mines should be forced to implement unproven, rigid national standards.

- *For the tailings category, EPA requires a plan to regrade surface during closure to a stable configuration that prevents ponding and promotes the conveyance of surface water off the unit, and that requires closure of all tailings impoundments and stacks considered to be critical structures to be designed for a long-term static factor of safety of 1.5 or greater and all non-critical structures to be designed for a long-term static factor of safety of 1.3 or greater; and requires that the units being closed be designed for a factor of safety of 1.1 or greater under pseudostatic analysis.*

  The Proposed Rule also appears to require that tailings facilities be covered to avoid the need for FR for this category. Tailings dams are typically regulated by FLMA geotechnical experts and State dam safety engineers. These individuals understand the specific requirements needed to ensure long-term dam stability. They generally allow site-specific demonstrations of the appropriate levels of stability to prevent dam failure. Similarly, mines must propose water management systems to ensure that water is not released that does not meet applicable standards. For this category, EPA has defied the proven approaches followed by existing programs with highly prescriptive requirements that are not based on any proven example of reducing environmental risk. AEMA specifically challenges EPA to provide a single example of substantive dam failure risk at a currently operating or proposed hardrock mining operation.

Similar arguments can be made about all of the proposed performance standards. Existing FLMA and State programs address each of the categories in a manner that ensures proper site-specific designs to minimize risk with appropriate FA to guarantee implementation. EPA does not (and cannot) cite a single operating mine where its requirements would address a Superfund liability risk not covered by existing programs.

As discussed above, EPA fails to justify the need for the regulations in the Proposed Rule by demonstrating any actual cases where currently operating or proposed mines are posing unacceptable risk of hazardous substance releases and potential creation of Superfund liability. Recognizing this weakness, EPA tries to make broad generalizations about supposed other environmental benefits of the rule without any supporting evidence. At a broad level, throughout the Proposed Rule and supporting documents, EPA again and again equates "risk" with the occurrence of a "release" [and other inappropriate risk surrogates]. This misleadingly fails to acknowledge that that the mere existence of releases is inadequate to demonstrate that any meaningful risk exists.

One clear example of EPA's misstatements of the supposed benefits of Proposed Rule is the following reference:

> *Waterways identified as impaired waters by section 303(d) of the Clean Water Act (CWA) and waters identified as wild and scenic rivers under the 1968 Wild and Scenic Rivers Act may benefit the most from improved environmental performance. Adverse impacts to waterbodies may be reduced or avoided in accordance with improvements in the environmental performance of mines.*

While some historic mining clearly contributed to water quality impairment, modern mining operations are required to comply with Clean Water Act provisions. The suggestion that modern mines will not comply and the Proposed Rule will lead to a better level of compliance is completely unsubstantiated. There is no evidence of any requirement in the Proposed Rule improving water quality at mines or surrounding watersheds.[21]

Next, EPA tries to use its findings from the Agency's National Enforcement Initiative (NEI): *Reducing Pollution from Mineral Processing Operations* to justify the benefits of the Proposed Rule. Like the CWA reference, EPA broadly states that its inspections have found significant non-compliance with hazardous waste and other environmental laws. It goes on to further indicate that the mineral processing and mining sectors generate more wastes that are corrosive or contain toxic metals than any other industrial sector. It is reasonable to debate EPA's findings on hazardous waste statute and regulatory compliance but EPA does not demonstrate that such non-compliance is not being addressed by existing regulatory and FA programs and these sites pose a risk of Superfund liability at modern mining operations. EPA's failure to establish a link between alleged non-compliance and the Proposed Rule requirements further demonstrates the fundamental weakness in its justification for the Proposed Rule.

EPA also misleadingly cites Toxic Release Inventory (TRI) data as justification for the Proposed Rule. EPA cites 2013 TRI data that indicates that the metal mining industry (e.g., gold ore mining, lead ore and zinc ore mining, and copper ore and nickel ore mining), reported quantities of onsite releases of hazardous substances, averaging nearly 1.7 billion pounds per year. EPA acknowledges that these numbers in no way represent actual risk of release to the environment. In fact, much of this volume relates to waste rock managed on-site that has little or no potential to cause a hazardous release or risk. Moreover, EPA recognizes that the TRI data is generally related to releases that are permitted under existing State and Federal law. However, EPA suggests that the mere presences of these materials in the mining industry somehow equates to environmental risk and potential Superfund liability. This is like saying because a rock in your backyard has some copper in it, it could cause a hazardous substance release for which you

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[21] AEMA anticipates that the anti-mining organization Earthworks (or another environmental NGO) may place into the rulemaking record a 2006 report prepared by Ann Maest and Jim Kuipers, *Comparison of Predicted and Actual Water Quality at Hardrock Mines – the Reliability of predictions in Environmental Impact Statements.* This report and its conclusions were debunked by Schlumberger Water Services in 2013, *Technical Review of Kuipers Maest 2006, Comparison of predicted and actual water quality at hardrock mines: The reliability of predictions in Environmental Impact Statements.* Among the findings of the Schlumberger review are that the conclusions in Maest Kuipers are not relevant to any current mines being permitted today; the conclusions regarding water quality exceedences could not be validated; and that the data set primarily focused on historical sites and sites permitted during the transition from an unregulated activity to modern regulations. This report is included with these comments and incorporated by reference.

should provide FR. Most strikingly, EPA provides no examples correlating TRI data to actual releases that triggered Superfund liability at modern mines. That is because it cannot do so.

Finally, having failed to demonstrate any financial justification for the Proposed rule or any evidence that environmental risks are not addressed adequately by existing programs, EPA states that the Proposed Rule will yield vague benefits in terms of changes in behavior among mining operations. Again, the theory is that because the mining industry caused issues in the past (pre-environmental statutes), it must not be environmentally responsible today, and, therefore, a burdensome, unsupported FR program is necessary. The mining industry is one of the most regulated and scrutinized industries in the U.S. To suggest that it behaves poorly compared to other industries is unsupported and offensive to AEMA's members that are committed to protecting the environment. This is clearly evidenced over the past decade by the lack of any tangible impacts from modern mining operations on human health or ecological systems. Overall, EPA has not demonstrated any linkage between the Proposed Rule and changes in behavior that would reduce risk.

In establishing the performance standards and the fiscal necessity to comply with them, EPA is effectively using the "financial responsibility" provisions of CERCLA §108(b)—a statute that says nothing about mines or mining—as statutory authority to establish itself as the super-regulator of hardrock mining in the United States, thereby usurping the authority of FLMA and State regulators that EPA itself concedes to have greater capability to evaluate such issues. Neither section 108(b) nor any other act of Congress has delegated that authority to EPA. In setting national criteria without regard to site-specific differences in such critical areas as geology, climate, hydrology, seismology, and ecology, EPA will be requiring mines to incorporate inflexible measures that a number of States have rejected for sound technical reasons, either as not needed or as affirmatively inferior to other options. EPA's approach will increase the costs to build and operate mines without providing an environmental benefit. As a result, a number of mines will be forced to prematurely close and new mines won't be built.

V. EPA's Flawed Formula

As more fully explained in the document prepared by SRK Consulting entitled *Review of Cost Estimate Formula for EPA's CERCLA §108(b) Proposed Rule* (marked as Appendix B to NMA's Comments and incorporated herein by reference), EPA's approach to estimating FR is fundamentally flawed. From a conceptual standpoint, EPA's reliance upon a generic, one-size-fits-all formulaic approach based on limited input variables and using statistical manipulation to estimate FR costs is a highly inaccurate, outdated and overall erroneous approach. The assumption that one formula can produce valid estimates of the cost of response actions for any facility type on any hardrock mine site is unreasonable. This generic approach does not consider critical, site-specific conditions that can profoundly affect the cost of such actions. For example, sites located in semi-arid environments will have a number of lower cost options available for management of solutions at the site. Likewise, the presence or absence of acid generating rock at a site can have a significant impact on site objectives, and therefore, the actions taken to achieve those objectives.

In contrast, the federal and state regulatory agencies began requiring site-specific closure and reclamation cost estimates to calculate FA obligations nearly 30 years ago, after abandoning the overly simplistic formulaic approach previously used. The change was based upon actual experience with mine design, operations and closure, which showed that simplistic approaches would not provide accurate cost estimates, sometimes seriously underestimating closure and reclamation costs. For example, prior to 1989, mine sites in Nevada were only required to post FA of $2,500 per acre, an arbitrary amount that subsequent experience by the agencies and the mining industry was shown to be wholly inadequate[22].

Although some international jurisdictions still use this type of overly simplistic method for FA estimates, jurisdictions with mature mining industries and advanced regulatory programs have abandoned, or are abandoning this approach in favor of requiring site-specific closure cost estimates.

VI. The Proposed Rule Must be Rejected because it Violates Numerous Executive Orders

As described below, EPA's Proposed Rule violates specific directives in Executive Orders (EOs) issued by Presidents Clinton, Obama, and Trump. Proceeding with the Proposed Rule is unjustifiable because of these violations.

A. President Clinton's Executive Order 12866

In September 1993, President Bill Clinton issued Executive Order ("EO") 12866 – Regulatory Planning and Review stating:

> *The American people deserve a regulatory system that works for them, not against them: a regulatory system that protects and improves their health, safety, environment, and well-being and improves the performance of the economy without imposing unacceptable or unreasonable costs on society; regulatory policies that recognize that the private sector and private markets are the best engine for economic growth; regulatory approaches that respect the role of State, local, and tribal governments; and regulations that are effective, consistent, sensible, and understandable. We do not have such a regulatory system today.*[23]

EPA's Proposed Rule does not comply with numerous aspects of EO 12866 including the requirement that rules use the most cost-effective option to achieve regulatory benefits, impose the least regulatory burden, avoid duplicating existing rules, harmonize federal regulations with State, local, and tribal regulations, and consider alternatives.

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[22] Although some states still use cost/acre as a regulatory guideline, those regulations require consideration of other site-specific factors and regulators have the discretion to consider other factors, and may increase the total bond above the guideline, if needed.

[23] http://www.presidency.ucsb.edu/ws/?pid=61560

In violation of EO 12866, EPA's Proposed Rule works against the interests of the U.S. mining industry and the broader best interests of our Nation that require mined materials for our infrastructure, our technology, our transportation, our defense, our security, and for all other aspects of modern life. The Nation's interests would be best served by developing domestic sources of such minerals.

The Proposed Rule violates EO 12866 because it places an enormous financial burden on the hardrock mining industry that will diminish the domestic production of minerals, cost U.S. mining jobs, and impose "unacceptable or unreasonable costs on society." The Proposed Rule also violates EO 12866 by failing to "respect the role of State, local, and tribal governments." Moreover, the Proposed Rule violates the 12 Principles of Regulation specified in EO 12866 as shown in Table 2.

Table 2
The Proposed Rule Contravenes Executive Order 12866 Regulatory Principles

EO 12866 Regulatory Principles	Proposed Rule Contraventions
Identify the problem to be solved	There is no problem. Adequate FA already provided by States' and FLMAs' FA programs, eliminating the need for the Proposed Rule.
Examine existing regulations	Existing States' and FLMA's regulations and FA programs eliminate the need for the Proposed Rule
Identify and assess alternatives to regulations	Relying on existing States' and FLMAs' FA programs is an obvious and viable alternative.
Consider the degree and duration of risks	There is minimal risk because the States' and FLMAs' regulatory and FA programs largely eliminate risks.
Use most cost-effective options to achieve the regulatory objective	States' and FLMAs' programs provide cost-effective FA for each CERCLA response category
Determine if benefits justify the costs	The Proposed Rule estimates minimal public benefits (no more than $15.5 million per year of savings to the government) at an enormous and unjustifiable cost to industry of at least $171 million per year.
Use best available information to determine the need for and consequences of proposed regulations	The numerous documents in the docket pertaining to legacy sites are irrelevant to the Proposed Rule, which governs current mining operations – not legacy sites. Similarly, CWA, TRI, and enforcement statistic data have no direct applicability to the Proposed Rule. The Proposed Rule should be based on information provided by the SERs, States, and FLMAs during and after the SBAR Panel process.

Table 2 **The Proposed Rule Contravenes Executive Order 12866 Regulatory Principles**	
EO 12866 Regulatory Principles	**Proposed Rule Contraventions**
Identify and assess alternative forms of regulation	Existing States' and FLMAs' FA programs reduce or eliminate the need for the Proposed Rule[24]
Harmonize federal regulations with State, local, and tribal regulations and functions	Proposed Rule is dismissive of and incongruent with State, local, and tribal regulations and functions
Avoid regulations that are duplicative, inconsistent, and incompatible with other federal regulations	Proposed Rule duplicates and is incompatible with existing States' and FLMAs' regulations and FA programs
Impose the least burdensome regulations including cumulative regulations	EPA estimates the Proposed Rule would create a $7.1 billion FA requirement and burden the mining industry with $171 million annual costs on top of existing FA requirements. It further assumes the availability of FA instruments to satisfy the requirements. Given EPA's own documented uncertainties in this assumption, the actual costs could be much higher and potentially devastating to the industry. As indicated by Advocacy's letter, the benefits are likely significantly overestimated and could be less than $1 million per year.
Minimize the potential for litigation	Per CERCLA §114(d), the Proposed Rule would preempt existing States' FA and result in litigation.

In compliance with EO 13777, EPA must write a Final Rule that is consistent with the Regulatory Principles in EO 12866. The Final Rule must recognize that a strong domestic hardrock mining industry is essential to the economic, defense, and security interests of the Nation. The Final Rule must reject the regulations in the Proposed Rule as being duplicative and unwarranted and find that the existing States' and FLMAs' regulatory requirements and FA programs eliminate risks, thereby rendering CERCLA §108(b) FR unnecessary.

B. President Obama's Executive Order 13563

It is ironic that the Obama administration's Proposed Rule violates President Obama's January 2011 EO 13563, "*Improving Regulation and Regulatory Review*." EO 13563 supplements and reaffirms the principles in President Clinton's EO 12866 and requires federal regulations to comply with EO 12866. EO 13563 recognizes that some industry sectors are subject to numerous regulations that may be redundant, and requires elimination of regulatory redundancies to reduce regulatory burdens.

[24] As discussed in Section II A, EPA's reliance on existing States' and/or FLMAs' FA to reduce or eliminate the need for CERCLA § 108(b) FA clearly demonstrates the Proposed Rule is unnecessary.

EO 13563 directs federal agencies to "…identify and use the best, most innovative, and least burdensome tools for achieving regulatory ends [and] take into account benefits and costs. This EO acknowledges, "Some sectors and industries face a significant number of regulatory requirements, some of which may be redundant, inconsistent or overlapping…" and requires federal agencies to "identify and consider approaches that reduce burdens."

In compliance with President Trump's EO 13777, EPA must withdraw the regulations in the Proposed Rule as currently drafted and develop a Final Rule that complies with President Obama's EO 13563 and President Clinton's EO 12866. As mandated by the Clinton, Obama, and Trump EOs, EPA's Final Rule must not unduly burden the hardrock mining industry, must appropriately weigh costs and benefits, and eliminate redundancy by recognizing that the States and FLMAs already have substantial FA programs that make an EPA program unnecessary.

C. President Trump's Executive Orders

In addition to EO 13777, President Trump has issued other EOs that are directly relevant to the Proposed Rule. The directives in these EOs require EPA to withdraw the regulations in the Proposed Rule. Two such EOs, EO 13771 and 13783, are discussed below.

President Trump's January 30, 2017 EO 13771, "*Reducing Regulation and Controlling Regulatory Costs*," establishes that it is the policy of the executive branch to be prudent and financially responsible in the expenditure of both public and private sector funds. In addition to managing the direct expenditure of taxpayer dollars, this EO requires federal agencies to control the financial burdens that compliance with federal regulations imposes upon the private sector.

To accomplish this objective, EO 13771 requires federal agencies to eliminate at least two existing regulations prior to promulgating any new regulations. It also mandates a net-zero cost to the regulated community in which the cost of new regulations must be offset by eliminating existing regulations that create equivalent cost burdens.

This EO has important fiscal implications for a future CERCLA §108(b) rule because before EPA can promulgate regulations under a Final Rule or determine that no such regulations are necessary (as it must to comply with the Court Order), the Agency would have to repeal two or more existing regulations to meet the net-zero cost savings mandate. If EPA were to proceed with the Proposed Rule as written, the Agency would have to repeal two or more regulations that cumulatively impose $171 million in annual private-sector costs to offset EPA's projected costs of the Proposed Rule.

EO 13771 also requires agencies to submit Regulatory Plans pursuant to EO 12866 and include any new rule approved during the Presidential budget process in the Unified Regulatory Agenda. Notably in the case of the Proposed Rule, EPA's internal memorandum regarding the President's FY 2018 budget specifically prohibits EPA from using any funds to finalize the regulations in the Proposed Rule: "None of the funds made available are to be used to finalize or enforce the proposed CERCLA 108(b) rulemaking on the hardrock mining industry, as the rule is currently written." This prohibition does not prevent EPA from issuing a **No Rule Final Rule.** EO 13771

and EO 13777 work hand-in-hand to reduce regulatory burdens. Considering the requirements in both of these EOs, it is clear that EPA must withdraw the regulations in the Proposed Rule.

A third EO, President Trump's March 28, 2017 EO, "Promoting Energy Independence and Economic Growth" (EO 13783), similarly requires EPA to reject the regulations in the Proposed Rule. This EO states that it is in the Nation's interest to develop a broad array of domestic energy resources including coal, natural gas, nuclear, hydropower, and renewable energy sources. This EO also establishes that the Nation's electricity must be affordable, reliable, safe, and secure and that it be produced from domestic sources.

EO 13783 requires agencies to avoid creating regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation. The Proposed Rule directly thwarts these objectives because it substantially burdens – and may even curtail altogether – the future production of energy from hardrock minerals like lithium and uranium; the distribution of energy which requires copper, gold, silver, zinc and other hardrock minerals; and the development of solar and wind renewable energy sources, which require rare earths, copper, gold, silver, and other hardrock minerals.

EO 13783 directs all executive branch departments and federal agencies to conduct an immediate review of regulations that potentially burden the development of domestic energy resources and suspend, revise, or rescind those that unduly burden the development of domestic energy sources. As shown in Table 3, the Proposed Rule violates several aspects of EO 13783. EPA must withdraw the regulations in the Proposed Rule in order to comply with EO 13783.

Table 3
Proposed Rule Contravenes Energy Independence Executive Order 13783

EO 13783 Energy Independence Directives	Proposed Rule Contraventions
Avoid regulatory burdens that unnecessarily encumber energy production	The onerous and duplicative FA requirements will interfere with and potentially eliminate the development of domestic deposits of lithium and uranium, two important energy resources
Ensure the affordability, reliability and safety of the Nation's electricity, by developing domestic coal, natural gas, nuclear, hydropower, and renewable energy resources	The Proposed Rule directly threatens the affordability and reliability of the Nation's electricity by imposing a substantial financial burden on the domestic producers of energy minerals used to produce and distribute conventional and renewable sources of electricity.
Require environmental regulations to have a greater benefit than cost	EPA projects the Proposed Rule will cost mining companies a minimum of $171 million per year while providing no more than a meager $15.5 million in annual taxpayer savings, which clearly violates this cost benefit mandate.

EPA must withdraw the regulations in the Proposed Rule because they violate EOs from three administrations: 12866, 13563, 13771, 13777, and 13783, and write a Final Rule by December 1, 2017 in order to comply with the Court Order. The Final Rule also must comply with the directives to avoid duplicative regulations, alleviate regulatory burdens, achieve a cost benefit, and not impede domestic energy production in the EOs listed above. The only Final Rule that will comply with these EOs is a Final Rule concluding that no additional FR pursuant to CERCLA §108(b) is required for hardrock mining.

The Court's January 29, 2016 opinion in *Idaho Conservation League et al* ("Opinion") provides EPA with broad discretionary authority regarding the scope and content of the rule – or even whether to issue a rule at all. EPA can thus satisfy the Court Order by developing a Final Rule that also complies with the EO regulatory directives.

> *...the proposed joint order*[25] *"does not require EPA to promulgate a new, stricter rule... At most, it merely requires that EPA conduct a rulemaking and then decide whether to promulgate a new rule — the content of which is not in any way dictated by the proposed order on consent — using a specific timeline...EPA retains discretion to promulgate a rule or decline to do so... The joint motion on consent states that "[n]othing in this Joint Motion should be construed to limit or modify the discretion accorded EPA by CERCLA or the general principles of administrative law.* (Opinion at 17, internal citations omitted.)
>
> *...the joint motion does not preordain the content of a rulemaking much less indicate that in committing itself to conducting a rulemaking EPA has prejudged the outcome for the hardrock mining industry.* (Opinion at 20)

Thus, pursuant to the Opinion, EPA has full authority to determine that CERCLA §108(b) FR is not necessary and therefore to issue a Final Rule that states no rule is warranted. EPA can readily justify this "No Rule" Final Rule based solely on the overwhelming data that the SERs, States, and FLMAs provided during the SBAR Panel process that document there are no un-bonded risks associated with the hardrock mining industry that justify a CERCLA §108(b) FR requirements. The comments filed during this comment period provide overwhelming additional support for that premise. **A No Rule Final Rule would be the best way to conform to congressional intent and satisfy all of the regulatory directives in the Clinton, Obama, and Trump EOs**.

VII. The Proposed Rule's Regulatory Burden Violates EO 13777 because there is Insufficient Market Capacity to Respond to the Proposed Rule's FA Demand

In response to a Congressional directive in the FY 2016 Conference Committee Report, EPA performed an analysis of the availability of FA instruments to satisfy the demand that a

[25] In re: *Idaho Conservation League et al*, Petitioners and EPA filed a joint motion for an order on consent ("joint motion") specifying an agreed upon schedule for the CERCLA § 108(b) rulemaking for the hardrock mining industry.

CERCLA §108(b) FR program[26] would create. EPA's highly flawed FA Market Study performed in conjunction with the rulemaking for the Proposed Rule reveals there could be insufficient marketplace capacity to satisfy EPA's projected FR requirement under the Proposed Rule. This finding underscores and quantifies the magnitude of the regulatory burden associated with the Proposed Rule, which would require the hardrock mining industry to obtain third-party FR instruments that would not be commercially available to many hardrock mining companies. EPA's Market Study confused "capacity" with "availability." Capacity does not equal availability. EPA failed to determine if FR instruments would be available regardless of capacity.

EPA's FA Market Study estimates there may be as much as $600 million of market capacity for environmental insurance and $5 billion for surety coverage, resulting in an aggregate market capacity of $5.6 billion potentially available to respond to a future CERCLA §108(b) FR requirement. (FA Market Study at 2). EPA's $7.1 billion estimate of the price tag for the CERCLA §108(b) FA program significantly exceeds the estimated FA market capacity. As indicated in comments by NMA and others such, we believe EPA's cost estimate of $7.1 billion is inaccurate and the costs are likely to be far higher.[27] With only $5.6 billion in market capacity, it is easy to see that many operations will not be able to find coverage in the market.

EPA's FA Market Study reveals a great deal of uncertainty regarding the market's ability to satisfy the demand for CERCLA §108(b) FA:

> *At this time it is not possible to predict the exact market for these instruments in response to EPA's CERCLA 108(b) regulations.* (FA Market Study at 5).
>
> *[T]here may be softening of the underwriting of traditionally volatile lines of business, including environmental liability and mining…Such uncertainty makes it exceedingly difficult to make inferences or predictions from the data as to future market trends and capacity.* (FA Market Study at 8).
>
> *[I]t is important to keep in mind that insurers and sureties will continue to be wary of business lines that are recognized as volatile (as the hardrock mining industry could be characterized).* (FA Market Study at 16).

Moreover, EPA's FA Market Study acknowledges that the universe of willing FA providers has recently shrunk noting that in January 2016, AIG, one of the largest underwriters of environmental liability insurance to cover large-scale and long-term environmental risks, announced it would no longer offer environmental impairment liability coverage. In evaluating AIG's announcement, EPA's research found that "the marketplace is continuing to evaluate the impact of this decision." (FA Market Study at 15).

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[26] CERCLA 108(b) Hardrock Mining and Mineral Processing Evaluation of Markets for Financial Responsibility Instruments and the Relationship of CERCLA 108(b) to Financial Responsibility Programs of Other Federal Agencies, August 25, 2016. ("FA Market Study")

[27] In its May 5, 2017 comment letter to EPA, Freeport McMoran indicated that it alone will have to add as much FR ($4-7 billion) as EPA projected for the entire mining industry ($4-7 billion).

Similarly, Wells Fargo informed EPA of the limited market capacity for covering mining risks, cautioning that "Energy risks, power and utility risks, and mining risks: these industries have significantly less capacity available to them, with carriers generally not willing to write more than a one- or two-year term." (FA Market Study at 18).

The Proposed Rule acknowledges that a FR program pursuant to CERCLA §108(b) would create a demand for FR instruments that the market may not be able to satisfy:

> *Given the number of unknown factors, the ultimate availability of CERCLA § 108(b) financial responsibility instruments cannot be predicted with certainty until the final rule has been promulgated. At that time, the available instruments will be determined, and the market will have an opportunity to respond.*(FR at 3399)

EPA's "Build it and They Will Come" theory about the future availability of FR instruments to satisfy the demand created by a CERCLA §108(b) rule is dangerously speculative, could result in serious regulatory compliance problems for the industry, and creates an extraordinary regulatory burden in violation of numerous EOs, including EO 13777, not to mention jeopardizing our national security by removing critical minerals for national security from domestic production.

The materials EPA provided to the SERs during the SBAR Panel process[28] showed projected FA costs for hypothetical companies with credit ratings ranging from CCC+ to B+. This analysis is inapplicable for some companies in the hardrock mining industry (especially small, startup companies like many of the SERs) that do not have a revenue stream and therefore do not have a credit rating.

For those companies that could qualify for third-party, commercial FR instruments, there is widespread concern over the cost of securing and maintaining these instruments. So, in addition to the problems associated with the projected limited market capacity to respond to a future demand for CERCLA §108(b) FR, the significant cash collateral required to obtain a CERCLA 108(b) FR instrument would be very problematic. This cash collateral requirement, which could be as much as 100% plus fees, would reduce the capital that companies have available to conduct reclamation activities, advance environmental improvement initiatives, and pursue business development opportunities. Ultimately the drain on corporate capital that would result from the CERCLA §108(b) FR program would reduce the domestic production of minerals, cost hardrock mining jobs, and economically devastate mining dependent rural communities.

As noted in EPA's Market Study, aspects of the CERCLA §108(b) FR program – especially the payout to multiple claimants (i.e., third parties seeking monies from the CERCLA §108(b) FR instruments for natural resource damages and other claims) – "presents a different regulatory framework [that was] not universally familiar to the providers." (FR Market Study at 5). The

[28] See August 23, 2016 EPA PowerPoint Presentation entitled "CERCLA 108(b) Financial Responsibility, Small Business Advocacy Review Panel Outreach for August 2016 Meeting"

issue of third-party claimants who have standing under CERCLA to seek money from the CERCLA §108(b) program could be a serious market constraint if FA providers are not willing to provide FR instruments under these circumstances. Secondly, the opportunity for third-party claims against a CERCLA §108(b) FR instrument is likely to increase the potential for frivolous damage claims and lawsuits.

Under EPA's own evaluation, the Proposed Rule carries an enormous annual industry price tag of $171 million. Based on EPA's Market Study, however, there is significant potential this is an underestimate of the actual costs to the mining industry. The central theme of EPA's Market Study is the suggestion that capacity will exist to provide the necessary financial instruments. However, as indicated above, there is great uncertainty in these predictions especially since the study provides no definitive indications of commitments to provide such instruments and the expected costs. If in fact, some or all hardrock mining companies cannot obtain such instruments, they would have to self-fund some or all of the required FA. Because they lack cash flow, most junior mining companies and mine developers will be unable to meet the financial test to self-insure or self-fund.

If facilities do have to self-fund the FA, the impacts on the US mining industry could be devastating. In highly competitive world markets, U.S. producers cannot afford to hold tens or hundreds of millions of dollars in escrow for potential future releases that EPA has not demonstrated could occur. Given the uncertainties expressed in the market study, it is highly negligent of EPA not to at least analyze implementation scenarios, including determining the socioeconomic impacts, where FA instruments are not available.

Because the Proposed Rule creates a FR requirement for which there is a reasonable expectation of inadequate commercial capacity, it places an unacceptable regulatory burden on the hardrock mining industry that violates the directives in EOs 12866, 13563, and 13771. This regulatory burden also is inconsistent with President Trump's EO 13777, and is therefore an excellent example of a proposed regulation that should be withdrawn pursuant to EO 13777.

VIII. The SBREFA SBAR Process Was Flawed

As indicated above, AEMA participated as a SER in the SBREFA required SBAR Panel process. AEMA submits that EPA failed to comply with the letter and spirit of SBREFA and violated its own Regulatory Flexibility Act (RFA) Guidance,

> *You should provide the SERs with enough information about the rule for them to be able to judge the likely impacts of the rulemaking on small entities. Outreach materials could include any draft of the rule or preamble text, if such materials are available*. Section 5.7.5.

Despite repeated requests for the model and formulae, EPA failed to provide this basic information necessary to determine the impact of a CERCLA §108(b) rule on small entities.

EPA failed to provide the SERs the formula for calculating FR requirements which prevented the SERs from determining the impact of the Proposed Rule on their operations. Throughout the SBAR process, the SERs expressed concern with the transparency of the process, the lack of relevant information about the model and formula and EPA's rush to get a Proposed Rule published by December 1, 2016 in order to comply with an arbitrary date in a Court Order. The result, in our view, is a flawed SBREFA process. Had EPA shared the formula and model with the SERs, we could have engaged experts to review the model and formula and helped EPA develop a rule with minimal adverse financial impacts on SERs and the hardrock mining industry while complying with CERCLA §108(b)'s mandate.

Throughout the SBAR process, AEMA and other SERs have repeatedly requested information concerning the model and formulae, including:

- the selection criteria used to identify the 63 mines used to inform the model/formula;
- the complete list of engineering controls and best management practices the agency is currently considering for reductions in the total financial responsibility obligation, including those controls and practices EPA intends to include that are currently required under state and federal regulatory programs;
- the criteria for identifying engineering controls and best management practices that will be assigned reduction values in the model/formula;
- the corresponding reduction percentages/values for each engineering control and best management practice and the criteria, formula, and assumptions used to determine these numbers; and
- the formula, calculations, and assumptions, including spreadsheets, used to determine the annualized instrument costs to obtain the hypothetical financial responsibility amounts in the SBREFA slides, including the costs for insurance policies, trust funds, and letters of credit, as well as information on costs for surety bonds (not provided in the slides, at the June 9 or August 31, 2016 meetings).

Without this information, it was impossible for the SERs to determine the financial impact of a CERCLA §108(b) rule on their businesses. By email dated September 6, 2016, AEMA requested additional information necessary to properly comment on EPA's proposal and fulfill our responsibility as a SER. By email dated September 14, EPA stated it was able to clarify some points, but would provide no new or additional information. EPA stated that it believes the information provided "*provides sufficient basis for meaningful comments from the SERs.*" AEMA disagreed. Without knowing how the financial responsibility for each of the 13 response categories was calculated and without knowing the criteria used to qualify for a reduction, our members could not determine the impact of a CERCLA §108(b) rule on their operations. It was impossible to evaluate the validity of the formula EPA intended to use. EPA failed to meet SBREFA's statutory requirements.

Advocacy's comment letter also discusses EPA's failure to comply with the RFA's requirement to consider significant small business alternatives (Advocacy letter, Section 5 at p. 14). The SBREFA amendments to the RFA provide that an agency's compliance with the RFA is judicially reviewable and that a court may remand a rule to the agency and defer enforcement.

See, Northwest Mining Association v Babbitt, 5 F.Supp.2d 9 (DDC 1998). EPA can avoid a remand of the Proposed Rule for failing to comply with the RFA by issuing a **No Rule Final Rule.**

IX. Conclusions

Based on information EPA did provide the SERs, information provided by FLMA and State regulators, and this rulemaking record, it is clear EPA has not done the diligence required to support the need for the regulations in the Proposed Rule. EPA acknowledges that the Proposed Rule is not appropriate for legacy sites, yet uses irrelevant, outdated legacy and pre-regulation site information to inform the formula and in an attempt to justify the Proposed Rule. At the same time, EPA has failed to provide any evidence to suggest existing FLMA and State FR programs are insufficient. This shifting of the burden of proving a negative is entirely inappropriate and illegal.

Furthermore, with EPA concluding that a CERCLA §108(b) rule will be applied only to mines operating on or after the effective date, or idle but authorized to operate on or after the effective date, it is unreasonable, arbitrary and capricious for EPA to assume that all currently operating mines and mines which will be authorized in the future pose a risk of releasing hazardous substances to the environment and that all 13 response costs will be incurred. The rulemaking record, including these comments and comments filed by industry, affected States, FLMAs, and Advocacy clearly demonstrates: 1) that modern mine regulatory and FA programs, together with modern mining practices and engineering controls are working; and 2) that a CERCLA §108(b) rule is unnecessary.

Therefore, EPA should conclude, based on the rulemaking record that the CERCLA §108(b)'s statutory mandate has been met and additional financial responsibility requirements are not necessary to protect the federal Superfund program and the American Taxpayer. The DC Circuit Court of Appeals empowered EPA to reach this conclusion in its Mandamus Order,

> *But the proposed joint order "does not require EPA to promulgate a new, stricter rule." Id. at 1324. At most, it "merely requires that EPA conduct a rulemaking and then decide whether to promulgate a new rule — the content of which is not in any way dictated by the [proposed order on consent]* — using a specific timeline." *Id.* The timeline in the joint motion requires that EPA commence a rulemaking with respect to hardrock mining by December 1, 2016, and provide "notice of its final action" by December 1, 2017. Joint Mot. 3. Although more is required with respect to hardrock mining than the other identified industries, where EPA retains discretion not to conduct a rulemaking at all, *EPA retains "discretion to promulgate a rule or decline to do so" even for the hardrock mining industry.*[29] (Emphasis added)

[29] *In re Idaho Conservation League, et al,* No. 14-1149 (DC Cir. January 29, 2016) at 17.

As discussed above, the costly and highly flawed Proposed Rule creates a regulatory burden on the hardrock mining industry that is duplicative, unnecessary, and inconsistent with numerous regulatory directives in President Clinton's EO 12866 and President Obama's EO 13563. Pursuant to President Trump's EO 13771, EPA would have to repeal two regulations that impose comparable costs (at least $171 million/year) on the private sector if the Agency elects to proceed with the Proposed Rule. EPA could avoid this impact altogether by withdrawing the regulations in the Proposed Rule and issuing a "No Rule" Final Rule.

The Proposed Rule would place an enormous and unjustifiable financial burden on the entire U.S. hardrock mining industry. The onerous and duplicative FR requirements in the Proposed Rule would substantially reduce domestic production of critically important minerals, put thousands of U.S. mining jobs at risk, and dramatically increase the Nation's reliance on foreign minerals. Clearly, these outcomes are not in the Nation's best interests and do not comply with the EOs discussed above.

For these reasons, AEMA strongly urges EPA to withdraw the regulations in the Proposed Rule and issue a Final Rule establishing that no additional FR is required for the hardrock mining industry. Withdrawing the Proposed Rule and replacing it with a Final Rule documenting that no additional FA is needed for modern hardrock mining operations would alleviate a substantial and unwarranted regulatory burden and help to lift the enormous cloud of uncertainty that is currently costing mining jobs and chilling investment in the U.S. hardrock mining industry. AEMA believes the record in the rulemaking for the Proposed Rule provides overwhelming support for this Administration to withdraw the regulations in the Proposed Rule and issue a Final Rule that no additional FR pursuant to CERCLA §108(b) is required for hardrock mining.

AEMA incorporates by reference as though fully set forth herein the comments of the NMA, Rio Tinto/Kennecott, Newmont Mining Corp., Barrick Gold N.A., Hecla Mining Company, Coeur Mining, Kinross Gold USA, and NOVAGOLD Resources.

Respectfully Submitted,

Laura Skaer

Laura Skaer
Executive Director

HARDROCK MINE RECLAMATION AND REGULATION

HOW CHANGING VALUES and CHANGING LAW CAUSED HARDROCK MINES to DESIGN, BUILD, and OPERATE for LONG-TERM CLOSURE and RECLAMATION: A FEDERAL and STATE REGULATORY SUCCESS STORY

prepared for the

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1.0 Executive Summary

The federal and state regulation of hardrock mining and milling facilities (collectively, "hardrock mines")[1] is a success story of environmental protection that is well-illustrated by the fact that of the **none** of the Western hardrock mines that were designed, built and/or approved in the last 26 years are on the United States Environmental Protection Agency ("EPA") National Priorities List of environmental cleanup sites. To characterize this another way, there has never been an environmental problem at a hardrock mine approved by a federal or state agency in the West after 1990 that required EPA to make any such hardrock mine a Superfund "top priority among known response targets." Finally, and most succinctly, no hardrock mine permitted/approved in the West after 1990 has ever been placed on EPA's Superfund National Priorities List. This is in stark contrast to Western hardrock mines designed and built prior to 1970 when there were no regulatory approvals for such facilities and no cultural guidelines.

The reasons for this are straightforward and summarized below.

Current hardrock federal and state mine regulation is protecting the environment. This is not just the opinion of the relevant agencies or the hardrock mining industry. It is also the opinion of the federal government's National Academy of Sciences/National Research Council and the bi-partisan Western Governors' Association.

In 1999, the federal government's independent National Academy of Sciences/National Research Council produced a comprehensive report entitled "Hardrock Mining on Federal Lands" regarding then-current hardrock mine regulation on lands managed by the federal government and states agencies and determined:

> The overall structure of the federal and state laws and regulations that provide mining-related environmental protection is complicated but generally effective.
> ...
> Simple "one-size-fits-all" solutions are impractical because mining confronts too great an assortment of site-specific technical, environmental, and social conditions. Each proposed mining operation should be examined on its own merits. ... **Recommendation: BLM and the Forest Service should continue to base their permitting decisions on the site-specific evaluation process provided by NEPA [National Environmental Policy Act].** ...

[1] For the purposes of this study, "hardrock mine" includes any facilities deemed to be a "mining" or "beneficiation" facility by the EPA. EPA has defined "mining and beneficiation" to include, generally, all metal mines, but EPA's use of the term "hardrock mine" also includes many non-metallic industrial mineral mines, such as phosphate rock, trona, fluorospar, and mica, as well as the mills required to concentrate the target minerals of these ores. See generally 40 C.F.R. 261.4(b)(7)(July 15, 2016). In common usage, EPA's "mining and beneficiation" is more typically referred to as "hardrock mining and milling" or just for the purposes of this Report sometimes "hardrock mine."

"Hardrock Mining on Federal Lands," National Academy of Sciences/National Research Council, Executive Summary, p. 5. Importantly, the bi-partisan Western Governors Association has determined that the Western States, which regulate hardrock mining on state and private lands within their borders, "... impose permit conditions and stringent design and operating standards, to ensure that hardrock mining operations are conducted in a manner that is protective of human health and the environment." WGA, Policy Resolution 10-16, Background (A)(8) ("National Minerals Policy"). Moreover, the states and federal agencies have continued to strengthen their reclamation and financial assurances requirements on an ongoing basis.

The correctness of the 1999 National Academy of Sciences determinations were revalidated and confirmed by Senator Murkowski's 2011 Investigation, when the United States Forest Service ("Forest Service") and the United States Bureau of Land Management ("BLM") reported to the Senator that out of 3,344 mining plans of operations approved by these two agencies since 1990, **none of these 3,344 federal mine plan approvals created an environmental problem that caused EPA to place any of these hardrock mines on EPA's highest priority environmental clean-up sites.** Therefore, Senator Murkowski's study objectively demonstrates the continued correctness of the National Academy/National Resources Council's 1999 determinations.

The development of the effective hardrock mine regulation and reclamation of the Forest Service, the BLM and Western States did not occur overnight. There was a "learning curve" that took a couple of decades. But the single most important factor creating effective hardrock mine regulation has been an American cultural shift since about 1970 with the advent of the modern environmental movement. Prior to 1970, municipal waste, industrial waste and hardrock mines were not regulated to protect the environment. Protecting the environment was not a major societal priority. The US hardrock has incorporated these environmental values into the cultural fabric of the industry.

The absence of environmental protections prior to 1970 was, in significant part, a legacy of the then-dominant American cultural focus from the Great Depression on jobs and the economy, followed immediately by World War II, the Cold War and the Korean War. All of these nation-threatening events caused the federal government to force dramatic and environmentally-harmful national efforts to quickly and heroically increase the chain of industrial and manufacturing production to historic heights. Hardrock mining was (and remains) the first and primary link in much of the manufacturing chain. Much of the CERCLA hardrock mine negative environmental legacy arose during this period or long before. Even in the late 1950s, President Eisenhower's forward-looking "Blueprint for America" did not even mention the environment.

The modern environmental movement, symbolized by the first Earth Day and by the enactment of the National Environmental Policy Act in 1970, evidenced a shift of our society from one that had been almost wholly-focused on industrial and manufacturing production values to a society where environmental values had a role, too. This shift in values was implemented by changes in law and regulation over the next twenty years as the United States adjusted to this more balanced approach to hardrock mining. As

discussed below, these laws, regulations and the collective experience of federal and states agencies, as well as the hardrock mine industry (learning from regulatory omissions along the way) have created a regulatory climate and an operating culture in which current hardrock mine regulation is an effective protector of the environment.

Hardrock mines designed and built prior to 1970 were developed to maximize production and minimize cost with little or no regard for environmental values. Importantly, however, after 1990, all new hardrock mines have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard. This is required by current law, but it is also required by the U.S. culture, generally, and by the U.S. hardrock mining industry, specifically.

Therefore, the EPA cannot rationally use information about environmental closure and reclamation costs from hardrock mines designed and approved prior to 1970 to assess the degree and duration of environmental risk associated with hardrock mines in 2017. Doing so would be as absurd as assuming that the design flaws of the 1964 Chevrolet Corvair, made infamous by Ralph Nader's 1966 book "Unsafe at Any Speed," should be used to assess whether any new National Highway Traffic Safety rules are needed in 2017. In both the hardrock mine and the NHTSA examples, the result of such assessments would be equally hopeless and comically out of date.

The Forest Service, the BLM, and the Western States reclamation agencies, in concert with the hardrock mining industry environmental management, have prevented any hardrock mine, designed and approved after 1990, from being deemed by EPA to be a "top priority" cleanup site.

This achievement is a genuine "success story."

2.0 Hardrock Mining Regulation Effectiveness – EPA has never determined that any hardrock mine approved by a federal or a Western State agency after 1990 to be among the "top priority among known response targets"

2.1 EPA's National Priorities List for CERCLA Cleanup

The federal "Comprehensive Environmental Response Compensation and Liability Act of 1980, as amended (commonly referred to as "CERCLA" or "Superfund"), requires EPA to publish the National Priorities List annually to identify the "national priorities among known releases or threatened releases [of hazardous substances] throughout the United States ...."[2] The National Priorities List identifies "[t]o the extent practicable, ... [EPA's] 'top priority among known response targets'...."[3] The National Priorities List ("NPL") includes over 1100 sites, which includes only about 50 hardrock mining sites, which, in turn are almost all pre-1970 facilities.[4]

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[2] 42 U.S.C. Section 9605(a)(8)(B).

[3] Id.

[4] http://www.epa.gov/superfund/sites/npl (March 30, 2012). Unfortunately, EPA had prepared and electronically-published a Table designated "Summary – Mining Sites on the National Priorities List"

EPA has specifically determined that hardrock mining wastes pose significantly lower environmental risk than "mineral processing" wastes, and so EPA has determined that "high volume" "low hazard" wastes should not be regulated as if they were "hazardous wastes."[5] Therefore, information about environmental problems with inorganic chemical plants and mineral processing facilities that generate actual "hazardous waste" does not provide any useful information to assess the environmental issues associated with hardrock mines. Accordingly, even more importantly, environmental regulatory issues associated with mineral processing facilities and inorganic chemical plants provide no information about the current regulation of hardrock mining. Mineral processing and inorganic chemical plants are subject to substantially different regulatory programs, standards and procedures than hardrock mines. In short, to have an intelligent discussion about the effectiveness of hardrock mine regulation one must evaluate hardrock mining and milling facilities that were actually subject to regulation since 1990. EPA's now-defunct NPL Mining Sites List failed to do this, since almost one-half of the EPA's so-called "Mining Sites" were in fact mineral processing or inorganic chemical plants.

2.2 A specific hardrock mine clean-up case study cannot be used to evaluate the effectiveness of *current* hardrock mine regulation if that specific hardrock mine had not been subjected to regulation prior to its design and construction

One cannot evaluate the effectiveness of hardrock mine regulation if one does not first consider whether or not a case study hardrock mine had been subject to regulation, and then second, if applicable, one must consider the nature of the specific regulation to which a hardrock mine had been subject to regulation *prior to its design and construction*. Obviously, it is utterly pointless, absurd, and deliberately misleading, to pretend to "evaluate" the effectiveness of hardrock mine regulation with reference to any hardrock mine that has never been subject to regulation! Nevertheless, nongovernmental organizations (NGO's) that seek their funding by opposing hardrock mines inevitably use

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("EPA's Mining Site List," May 2013, www.epa.gov/aml), but EPA's Mining Site List was highly misleading because it did not include only hardrock mines, nor even just "hardrock mining and milling sites." Unfortunately, EPA's "Mining Sites List" included large numbers of downstream inorganic chemical plants and "mineral processing" sites that are not hardrock mines. This critical substantive distinction seems to have given rise to multiple legal actions filed by non-governmental organizations ("NGO") against the hardrock mining industry and against EPA speciously seeking regulation of hardrock pursuant CERCLA 108(b). Fortunately, after the NWMA/AEMA provided its public comments regarding EPA's fatally-flawed "Summary – Mining Sites on the National Priorities List" and other closely-related issues in EPA's "Bristol Bay" public docket (see discussion in Section 2.4 below), EPA terminated its dissemination of this particular grossly misleading information by removing it from EPA's website. Nonetheless, the NGO legal challenges against the mining industry that were apparently supported, in part, by EPA's years of misinformation regarding the hardrock mining industry, continue to this day.

[5] See 50 Fed. Reg. 40,292 (Oct. 2, 1985); EPA, "Report to Congress, Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale," (Dec. 31, 1985); 55 Fed. Reg. 32,135 (Aug. 7, 1990); and EPA, "Report to Congress on Special Wastes from Mineral Processing" (July 1990).

historical and factually irrelevant examples to suggest there are current problems with hardrock mines in both regulatory and litigation settings.[6]

Hardrock mines designed and built prior to 1970 were developed to maximize production and minimize cost, but after 1990, all new hardrock mines have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard, as required by current law and culture. Therefore, the success of hardrock mining regulation must be evaluated by using reasonably current applicable rules.

No one would suggest that General Motors (GM) should be prohibited from producing cars in 2017 or subject to new regulation because, in 1965, GM produced the Corvair (deemed "unsafe at any speed" by Ralph Nader[7]) which does not meet 2017 standards. Yet, critics of the hardrock mining industry repeatedly and constantly describe environmental problems at hardrock mines that were designed and operated prior to 1970 as illustrative of current hardrock mine.[8] This is absurd.

Hardrock mines designed and operated prior to 1970 were in place long before hardrock mines were subject to any regulation whatsoever. Thus, it is critical to determine, even if only generally, the extent to which any hardrock mine used as an example or case study to evaluate the effectiveness of hardrock mine regulatory programs has actually been subject to relevant regulatory programs.

2.3 Hardrock mines on the National Priorities List must be rationally classified into three (3) major eras based upon applicable regulation or the lack thereof: (1) Pre-Regulatory Era (prior to 1970); (2) Transition Regulatory Era (1970 through 1990); and, (3) the Regulated Hardrock Mine Era (post-1990).

Hardrock mine regulation must be classified into 3 major eras based upon the extent of applicable regulation or the lack thereof: (1) Pre-Regulatory Era (prior to 1970); (2) Transition Regulatory Era (1970 through 1990); and, (3) Regulated Hardrock Mine Era (Post-1990). Below, Section 4.0 ("Changing Societal Values – The Great Depression, World War II, the Cold War, and the Advent of the Modern Environmental Movement") provides some of the policy history supporting use of these three temporal classifications. Further below, Section 5.0 ("Development of Legally-Applicable Hardrock Mine

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[6] Maest, A.S., Kuipers, J.R., Travers, C.L. and Atkins, D.A., 2005, "Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties, and State-of-the Art." But importantly also see, Schlumberger Water Services, 2013, "Technical Review of the Kuipers Maest, 2006, 'Comparison of predicted and actual water quality at hardrock mines: The reliability of predictions in Environmental Impact Statements,'" p. 1, that determined *inter alia* that "The conclusions contained in the [Maest Kuipers, 2006] report are not relevant to any current mines that are being permitted, or to any future mines ...[because] [m]odern-day characterization and analysis techniques have changed so radically from virtually all of the studies cited by the report that it is meaningless to draw any comparison to modern-day conditions." Emphasis added.

[7] Nader, Ralph, Unsafe at any speed: The Designed in Dangers of the American Automobile, Grossman Publishers, 1965.

[8] See footnote 6, supra.

Regulation") provides a summary of the primary legal support for using these three (3) temporal classifications.

Facilities designed and constructed in the Pre-Regulatory Era (prior to 1970) provide no useful information about the effectiveness of current hardrock mine regulation "predictions" since Pre-Regulatory Era Hardrock Mines were designed, constructed and operated to maximize production and minimize cost. Pre-Regulatory Era Hardrock mines did not even consider long-term environmental closure and reclamation. In stark contrast, long-term environmental closure and reclamation are required by current federal and state law, while Pre-1970 hardrock mines were never subject to any regulation whatsoever. Even worse, Pre-Regulatory Era facilities were conceived, designed and operated even before environmental values were imbedded in the American culture. Thus, when subsequently enacted laws and regulations were applied to these facilities after-the-fact, such regulatory efforts could not influence the facility design and construction. Thus, such regulation could never hope to prevent *all* releases to the environment from facilities. For example, tailings facilities from the Pre-Regulatory Era were often designed to release to the ground water for reasons of structural safety, while even simple release-reporting to ground water was only required starting in the 1980s, and even then, only under certain limited circumstances. In short, pre-1970 Pre-Regulatory Era facilities were not conceived, designed or operated with significant concern for the environment.

Importantly, even hardrock mines designed and constructed during the Transition Regulatory Era were often not subject to direct regulatory approvals. But at least there was an increasing cultural awareness of the regulated community and the government that environmental values needed to be considered, even if imperfectly. However, *those Transition Regulatory Era Mines that were actually subject to regulation* were never subject to full control of surface and ground water regulation and geochemical predictive modeling that characterizes current hardrock mine permitting.

For example, in 1985, it was EPA's assessment was that "EPA data on management methods at mining facilities indicate that only a small percentage of mines currently [i.e., 1985] monitor their ground water, use run-on/run-off controls or liner, or employ leachate collection, detection, and removal systems." 50 Fed. Reg. 40,292 (Oct. 2, 1985); EPA, "Report to Congress, Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale," (Dec. 31, 1985) ("RTC I," p. ES-10.) Therefore, as a practical matter, according to EPA, any discussion of the effectiveness of "environmental predictions" at facilities designed and approved prior to 1985 is utterly meaningless. To restate this point, hardrock mining facilities designed and approved prior to 1985 do not provide any useful information about current regulation of hardrock mines because pre-1985 hardrock mines were not designed, built and operated to integrate long-term environmental closure and reclamation. This is in sharp contrast to current law and regulation.

Therefore, per EPA, there was almost no comprehensive regulation of ground water discharges prior to 1985. Of course, such programs were not created overnight. Even in

1990, programs specifically designed to preclude groundwater releases from mining facilities were in their infancy and geochemical "predictive" modeling was largely conceptual at that time. Modern geochemical predictive modeling really did not begin practical application as a regulatory tool in the mid-1990s. For example, Earthworks, a group that opposes the hardrock mining industry, contracted for a report "Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties, and State-of-the Art" in which of 202 references cited to, only 28 dated from before 1990, and most of the directly pertinent geochemical references have been published since 2000.[9] Nevertheless, if one evaluates and then assigns each hardrock mine that EPA has deemed to be among its "top priority among known response targets" (i.e., the NPL) to the major regulatory era when it was designed, constructed and approved, then a very clear and incontestable picture develops, as discussed immediately below.

2.4 Northwest Mining Association June 30, 2013 Comments on EPA's Bristol Bay Watershed Assessment determined that current hardrock mining regulations were protective of the environment, citing to specific federal and state government studies that explicitly support this conclusion.

The American Exploration & Mining Association (AEMA) (formerly Northwest Mining Association or "NWMA") provided comments to EPA's Bristol Bay Watershed Assessment concerning the Alaskan Pebble Project on June 30, 2013 regarding the effectiveness of existing hardrock mine regulation. Baird, 2013, "Hardrock Mining Reclamation and Reclamation – Developing Sustainable Environmental Protection through Changing Values, Changing Laws and Experience: A Federal State Success Story" (the "NWMA 2013 Study"). The NWMA 2013 Study provides detailed support to arrive at its conclusions that:

> Current Hardrock Mining regulation is protecting the environment. However, this is not just the opinion of the relevant agencies or the Hardrock Mining industry; it is the opinion of the National Academy of Sciences and the bi-partisan Western Governors' Association.

Unfortunately, EPA apparently wholly-ignored the NWMA 2013 Study with regard to the "Bristol Bay Watershed Assessment," except that the NWMA 2013 Study may have caused EPA's to terminate use of its so-called "NPL Mining Site List." Nevertheless, to date, EPA has never referenced the NWMA/AEMA's 2013 Study.

AEMA must assume EPA's failure to acknowledge the relevant indisputable facts described in NWMA's 2013 Report has something to do with the bias that occurred within EPA regarding the "Bristol Bay Watershed Assessment." More specifically, the respected Cato Institute "think tank" has stated:

> Because there was never a mining permit application [submitted for the Pebble Project], EPA charged a senior biologist (not a mining engineer)

[9] See footnote 6, supra.

> named Phillip North to design a worst case scenario open-pit 'hypothetical mine' that could never be approved. ... North then proceeded to 'model' the maximum deleterious impact of the nonexistent, unplanned, and imaginary mine ...
>
> EPA and North simply ignored ... [a $150,000,000 in scientific study of the] biology, ecology, and dynamics of the Bristol Bay watershed. EPA and North simply ignored this remarkable repository of information before admitting, during the entire time that the Bristol Bay Watershed Assessment was written (2011-2014), that it was never really intended to provide a scientific foundation for regulatory decision-making, after all.
>
> ...
>
> While he was creating his hypothetical mine, Mr. North also coached anti-Pebble activists on how to petition his own Agency to stop the real permit application. It appears he even wrote petitions. ...

Mamula, Ned and Michaels, Patrick J., 2016, "A Green Mess: Is EPA in Hot Water over Alaska's Bristol Bay?" http://www.cato.org/publications/commentary/green-mess-epa-hot-water. Importantly, when the House Oversight Committee sought to bring Mr. North before a Committee Hearing in 2013:

> ... he delayed, bobbed and weave, and suddenly pulled his children out of school and fled the country.

Id. Therefore, the AEMA/NWMA must assume that the important information that it has previously presented to EPA regarding the adequacy of existing hardrock mine reclamation has been lost to EPA's unethical Bristol Bay Watershed Assessment sideshow.

Accordingly, the AEMA has developed this document in 2017 to further support its and refine the NWMA's original demonstration that currently, federal and state hardrock mine reclamation programs and financial assurance mechanism are protective of the environment. Therefore, the AEMA commissioned the independent expertise of Enviroscientists, Inc. to review and assess NWMA's 2013 Report to be sure that its information is fully considered by future EPA actions.

2.5 The 2015 Enviroscientists Report confirms the AEMA/NWMA Comments on the Bristol Bay Watershed Assessment in June 2013 that determined that no Western hardrock mine has been placed on the CERCLA NPL since 1990

Dr. Richard DeLong of Enviroscientists, Reno, Nevada, has completed an assessment of U.S. Environmental Protection Agency's National Priorities List ("NPL") for Mining and Milling Sites. Please see attached "Memorandum" from Richard DeLong to Joe Baird,

Baird Hanson LLP, dated, May 15, 2015, "Assessment of Mining and Milling Sites on the National Priorities List" ("Enviroscientists Memo"). Dr. DeLong's analysis states:

> There are over 1,100 sites on the NPL. Of those, there are 100 that the EPA has classified as MMS [i.e., "Mining and Milling Sites"]. However, only 55 of those sites are actual mining operations where mineral resources were extracted from the earth. The other 45 are mineral processing facilities where a mineral product is delivered to the operation for further processing. The 55 "hardrock" MMS on the NPL fall into the following temporal classifications: 49 are prior to 1970; five are from 1970 through 1990; and one is post-1990 and it is the Barite Hill property in South Carolina.

Therefore, per the Enviroscientists' Memorandum, the 55 Mining and Milling sites on the NPL fall into the following temporal classifications:

Pre-Regulatory Era (prior to 1970)	49
Transition Regulatory Era (1970 through 1990)	5
Regulated Hardrock Mine Era (post-1990)	1[10]

By eliminating the "red herring" mineral processing and inorganic chemical plants from the EPA's so-called "Mining" Sites List of 100 sites, the EPA List can be corrected to include about 55 sites that are hardrock mining sites, but **only if** one includes hardrock mining sites from ***all*** eras, including many historic facilities dating back to the 1800s, which obviously provided no information about 20th century mine design, construction, operation and reclamation/closure practices, let alone 21st century practices.

Obviously, and most importantly from the perspective of evaluating the success of current hardrock mine regulation, *none* of the hardrock mines on the National Priorities List were approved after 1990 in the West.[11] Moreover, this is validated and updated regarding federal lands by the Forest Service and the BLM, as discussed immediately below.

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[10] Barite Hill, McCormick County, South Carolina, EPA Facility ID SCN000407714. According to EPA, from 1991 to 1995, gold and silver mining was conducted at the site.

[11] It is important to note that eliminating mineral processing and inorganic chemical plant sites almost certainly does not affect the number of regulated facilities from EPA's so-called Mining Site List that would be deemed to be located on the NPL since 1990. In fact, there have been very few new mineral processing facilities constructed since 1990, other than updating of existing facilities (e.g., Rio Tinto's Utah Copper Division) or use of small "mineral processing" facilities such as the dore furnaces commonly located at gold mines. Very few, if any, new large regional mineral processing facilities have been constructed since 1990. Nevertheless, one cannot have an intelligent discussion about the efficacy of or even enumerate the issues related to regulating hardrock mines and mills if the data includes information about mineral processing and inorganic chemical plants.

3.0 Current hardrock mine regulation is protective of the environment, as determined by: (1) the United States National Academy of Sciences; (2) the Western Governors Association; and, (3) Senator Murkowski's 2011 Investigation.

3.1 The National Academy of Sciences/National Research Council has determined that existing hardrock mine regulation on federal land is "complicated but generally effective" in protecting the environment.

In 1999, the federal government's independent National Academy of Sciences/National Research Council ("NAS/NRC"), including several-related organizations,[12] produced a comprehensive report entitled "Hardrock Mining on Federal Lands" regarding then-current hardrock mine regulation on lands managed by the Forest Service and the Bureau of Land Management and determined:

> The overall structure of the federal and state laws and regulations that provide mining-related environmental protection is complicated but generally effective.
> ...

NAS/NRC, 1999, "Hardrock Mining on Federal Lands," p.5. Importantly, the NAS/NRC also identified a number of areas where implementation of existing laws could be improved, Id., pp. 6 – 9, and all of the NAS/NRC recommendations that increased the protection of the environment have since been adopted into current federal law.

Importantly, the Forest Service and the BLM continue to improve their programs. Since the 1999 NAS/NRS determination, for example, the Forest Service developed a new "Training Guide for Reclamation Bond Estimation and Administration – For Mineral Plans of Operation authorized and administered under 36 CFR 228A" in 2004, which considered the decades of experience that had developed concerning creating financial assurances and distilled much of this practical knowledge into the Forest Service manual. Additionally, in 2001, the BLM expanded its program to provide for financial assurances on all surface disturbing activities, including notice-level exploration projects affecting fewer than five acres. Thus, the hardrock mining regulation protecting federal land is continually improving and adjusting to take into account the lessons learned from experience, as is required pursuant to NEPA "adaptive management" strictures. These existing regulatory programs already substantially limit or eliminate the degree and duration of environmental risk associated with the current hardrock mining industry.

3.1.1 The NAS/NRC Report determined that "[s]imple 'one-size-fits-all' solutions are impractical because mining confronts too great an assortment of site-specific technical, environmental, and social conditions."

[12] "Committee on Hardrock Mining on Federal Lands," "Committee on Earth Resources," "Board on Earth Sciences and Resources," "Commission on Geosciences, Environment, and Resources."

Over the last 40 years, the Forest Service and the BLM have developed complicated, but nonetheless workable and environmentally protective programs under the auspices of their own authorities comprehensively coordinated by the National Environmental Policy Act ("NEPA") to properly evaluate and take into account site-specific conditions. The NAS/NRC properly characterizes the situation.

> Conclusion: Federal land management agencies' regulatory standards for mining should continue to focus on the clear statement of management goals rather than on defining inflexible, technically prescriptive standards. Simple 'one-size-fits-all' solutions are impractical because mining confronts too great an assortment of site-specific technical, environmental, and social conditions. Each proposed mining operation should be examined on its own merits. ... Recommendation: BLM and the Forest Service should continue to base their permitting decisions on the **site-specific evaluation** [emphasis added] process provided by NEPA. The two land management agencies should continue to use comprehensive performance-based standards rather than rigid, technically prescriptive standards. ...

"Hardrock Mining on Federal Lands," Executive Summary, p.5. The NAC/NRC emphasis on the criticality of site-specific evaluation is emphasized by NEPA, CERCLA's ARARs process and state permitting for determining rational standards that are protective of the environment and create realistic mechanism for reclamation guarantees.

3.1.2 The NAC/NRC Report correctly characterizes current hardrock mining industry as having minimal impact on public lands and NAC/NRC Report also correctly characterizes the importance of hardrock mining to the US economy and to US manufacturing

The NAC/NRC Report "... respond[ed] to a request by Congress that the National Research Council assess the adequacy of the regulatory framework for hardrock mining on federal lands." "Hardrock Mining on Federal Lands," Executive Summary, p. 1. Importantly, the Report states that "[t]he area of federal land available to hardrock mining in the Western states is enormous, but the surface area actually physically disturbed by active mining is small in comparison ... [a]pproximately 0.06% of BLM lands are affected by active mining and mineral exploration operations." Id. And, "while society requires a healthy environment, it also requires sources of materials, many of which can be supplied only by mining." Id. Importantly:

> Regulations intended to control and manage the alteration of the landscape and the environment in an acceptable way are generally in place and are updated as new technologies are developed to improve mineral extraction, to reclaim mined lands, and to limit environmental impacts.

Thus, the NAC/NRC Hardrock Mining Report correctly notes that hardrock mining has a minor surface area "footprint" relative to total federal lands, and that society requires mining for survival.

3.2 Current hardrock mine regulation continues to be protective of the environment on federal lands as further evidenced by the United States Forest Service and the United States Bureau of Land Management Responses to Senator Murkowski's 2011 Investigation

By letter dated, March 8, 2011, Senator Murkowski's (R-AK) asked the Forest Service and the BLM how many mine plans of operations ("MPOs") the agencies had approved since 1990 and asked how many of those approved MPO facilities subsequently were listed by EPA on the NPL? The Forest Service responded to Senator Murkowski by stating that they had approved 2,685 MPOs since 1990 and stated that none of these required EPA to place them on the NPL. The BLM responded to Senator Murkowski by stating that they had approved 659 MPOs after 1990 and stated that none of these required EPA to place them on the NPL.

Thus, the 1999 NAS/NRC determination that current hardrock mine regulation was protective of federal lands was additionally confirmed and updated by Senator Murkowski's 2011 Investigation.

3.3 The Bi-Partisan Western Governors' Association confirms that the Western States "have a proven track record in regulating mine reclamation in the modern era, having developed appropriate statutory and regulatory controls" that are "protective of human health and the environment" as well as being protective of public treasuries

The Western Governors' Association has repeatedly determined that current Western States' hardrock mine regulation is protective of human health and the environment. The Western States have agencies and staffs that have been exclusively dedicated to prospective mine regulation and to prospectively requiring mine operating and mine reclamation plans. Additionally, good regulatory work and correct mine financial assurances have not only protected public health and the environment, but these regulatory programs have also protected state and federal public treasuries. Importantly, these WGA determinations have been Bi-Partisan. Even more importantly, these determinations regarding the quality of Western states mine regulation and reclamation have been on-going, made year-after-year, by an ever-changing group of Bi-Partisan Western Governors. Please note that WGA policy statements are either, renewed, updated or "sun-setted" every three (3) years, but it is also important to see the evolution of these policy statements.

In 2010, the Western Governors' Association ("WGA") stated:

> The Western States ... extensively regulate hardrock mining operations on both public and private lands, and uniformly impose permit conditions and

> stringent design and operating standards, to ensure that hardrock mining operations are conducted in a manner that is protective of human health and the environment, and that, at closure, the mined lands are returned to a safe, stable condition for productive post-mining use.

WGA, Policy Resolution 2010-16, Background (A)(8) ("National Minerals Policy"). More recently, in 2011, the Western Governors Association "Policy Statement" further emphasized the above points stating simply:

> The member states have a proven track record in regulating mine reclamation in the modern era, having developed appropriate statutory and regulatory controls, and are dedicating resources and staff to ensure responsible industry oversight.

WGA, Policy Resolution 2011-4 ("Bonding for Mine Reclamation"). Previous WGA policy determinations provided foundation for the correctness of the above determinations, stating that:

> All Western states ... have staff dedicated to ensuring that ongoing mine operations develop and follow appropriate reclamation plans.
>
> ...
>
> Western states have a proven track record in regulating mine reclamation in the modern era – including for hard rock mines – having developed appropriate statutory and regulatory controls, and are dedicating resources and staff to ensure responsible industry oversight.

WGA, Policy Resolution 2014-07 ("Bonding for Mine Reclamation"). Thus, while the National Academy of Science/NRC confirms that hardrock mine regulation on federal lands is "generally effective," the Western Governors' Association confirms that the Western States' hardrock mine regulation is also "protective of human health and the environment." Collectively, this means that all Western lands, federal and state (including private) lands are covered by adequate regulations regarding hard rock mining.

Thus, since it has been well-established that state regulatory and policy regulation of hardrock mining protects human health and the environment, it is important to also ensure that such regulation is protective of the state public finances, as well.

In 2014, the WGA correctly determined regarding the Western mining states that:

> An important component of a state's oversight of mine reclamation is the requirement that mining companies provide financial assurances in a form and sufficient to fund required reclamation if, for some reason, the company itself fails to do so [often referred to generically as "Bonding"].
>
> ...

> All Western states have developed regulatory bonding programs to evaluate and approve the financial assurances required of mining companies. The states have developed the staff and expertise necessary to calculate the appropriate amount of the bonds, based upon the unique circumstances of each mining operation, as well as to make informed predictions of how the real value of current financial assurance may change over the life of mine, even post-closure.

WGA, Policy Resolution 2014-07 ("Bonding for Mine Reclamation"). These are powerful Bi-Partisan collective gubernatorial determinations made over a period of recent years. Importantly, these statements by Western State political leaders are well-supported by the independent factual record.

3.4 Current hardrock mine regulation is protective of the environment on all federal and state Western lands – A Summary

In 1999, federal hardrock mine regulation programs of the USFS and the BLM were deemed to be "generally effective" in protecting the environment by the National Academy of Science/National Research Council. In 2011, Senator Murkowski's investigation of the BLM and Forest Service mine regulation experience verified and updated the 1999 NAS/NRC determination. And the Bipartisan Western Governors' Association has determined that the state hardrock mine regulatory programs were both "protective of human health and the environment" and protective of public treasuries.

Importantly, such regulatory "treasury protection" does not even consider the major additional public benefit of mining revenue from state revenue from taxes, severances taxes, and employee income taxes, among other sources, which are substantial since mining jobs (i) are traditionally some of the highest paying hourly wages in any state (ii) like any industrial enterprise, have substantial job multiplier effects on supporting business and employment and (iii) typically produce products that are the necessary inputs for US manufacturing.

Nevertheless, it is reasonable to ask, "Why is hardrock mine regulation so effective now, when historic operations created significant problems?" Obviously, as discussed above, part of the answer is simply that prior to 1970 (i.e., the Pre-Regulatory Era) there was no significant environmental regulation of hardrock mines. However, it is also important to recognize that prior to 1970 there was also no significant environmental regulation of municipal waste or municipal sewage, nor was there any significant regulation of manufacturing environmental impacts. The "bottom line" is that the American culture has now made environmental protection a priority value – not only for the hardrock mining industry, but also for local communities, industry, the regulatory community, and the public. Therefore, unlike in decades gone-by, public, private and NGO managers are now paying close attention to hardrock mining environmental issues that did not even show up on the policy "radar screen" prior to 1970.

4.0 Changing Societal Values – The Great Depression, World War II, the Cold War, and the the Modern Environmental Movement

4.1 Prior to 1970, there was virtually no direct regulation of municipal sewage, industrial wastes or hardrock mines.

Prior to 1970, there was no significant regulation of hardrock mines at either the federal or state level. Mining was not an exceptional activity in this regard. Prior to 1970 there was very little direct regulation of municipal sewage or industrial waste discharges. The early federal water pollution control laws were primarily construction grants programs that were public works projects subsidizing certain activities, but these were not regulatory prohibitions. Rivers, lakes and other water bodies were deliberately used to dispose of all types of septic, chemical and industrial wastes.

Prior to 1970, government and industrial managers did not "see" environmental pollution as a problem or they simply did not know what to do about it. In 2017, this may seem incomprehensible. However, if one briefly reviews our history leading up to this point, one can quickly understand how the culture reached this point. More importantly, for the purpose of this report, in part, it explains why the regulatory omissions of the past will not be repeated, even without specific regulatory prohibitions.

4.2 Societal Values of "The Greatest Generation"

Tom Brokaw's iconic 1998 book *The Greatest Generation*[13] describes the generation of American who came of age in the poverty of the Great Depression and went on to fight World War II, the Korean War, the Cold War, and then participated in generating an era of comparative affluence in the 1950s and 1960s. The deprivation of the Great Depression created a culture in which jobs and manufacturing production were the primary concerns. Belching industrial smokestacks symbolized prosperity in one town, while clean air in the next town symbolized factory closure and unemployment. For example, in 2016, it is now ironic to note with regard to a historic smokestack at a Hoover vacuum manufacturing facility that:

> ... the Hoover Co. understood the value of the tall chimney promoting the burgeoning company at a time when companies took pride in the height of their smokestacks. While today they may represent industrial pollution, in that era, the image of the black billowing smoke from a tall chimney stack represented prosperity. 'They wanted it to be a symbol of their company by putting their name on it,' Fernandez said. 'Every time somebody would take a picture of North Canton [Ohio], that chimney is in the picture.' 'It's certainly symbolic.'

"Iconic Hoover Smoke Stack to be Restacked," Robert, Wang, The Canton Repository, December 4, 2014. Obviously, this describes a very different set of values from the environmental values that are foundational to the US in 2017.

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[13] Brokaw, Thomas, The Greatest Generation, Random House, New York, 1998.

The economic desperation of the Great Depression focused both public and private values upon the primary mission of finding ways to generate employment, manufacturing production and material prosperity to the exclusion of almost all other societal values. Thus, for example, when President Roosevelt's New Deal promoted multiple massive government dams on the Columbia River and Tennessee River systems progressive folk hero Woody Guthrie celebrated these achievements with songs like "Roll On, Columbia, Roll On" and "Grand Coulee Dam" unabashedly supporting such projects without any apparent concern about the associated major environmental, social or First Nation impacts. "Environmental concerns," as we now understand them were not part of the mainstream culture. The American culture of the Great Depression was one that necessarily worshiped jobs, production and material prosperity above all other values. These traits became even more deeply embedded into the American cultural fabric by the advent of World War II ("WWII") and its precursor events.

Strategically, WWII was to be won or lost based not just upon the bravery and sacrifice of soldiers, sailors and airmen, but also by delivering a crushing weight of one nation's gross national product ("GNP") onto the enemy nation. At the time, the United States excelled at this form of industrial warfare. At the time, the US could generate GNP quickly and in vast quantities of material, and the US did exactly that. Idled factories were brought back to smoking productively, while liquid (and solid) industrial wastes were conveniently disposed in the waterways behind these same plants.[14] Massive new industrial production facilities were conceived of and brought into production within months, not years. Enormous new manufacturing plants were constructed to build aircraft, ships, tanks, trucks, weapons and munitions, to name just a very few of the critical implements of war. Whole new cities were constructed, seemingly overnight, to meet various production goals, and indeed, the "Manhattan Project" developing atomic weapons built new towns and industrial facilities like Oak Ridge, Tennessee and Los Alamos, New Mexico in secret, without any oversight other than that that ensured production was achieve ASAP. There was no "permitting" of any of these great public works, and little or no consideration of environmental values.

Critically, all manufacturing requires mineral inputs as primary material ingredients and the wartime plants consumed the products of hardrock mines voraciously, demanding immediate expansion of the hardrock mining industry during WWII without regard to environmental impacts.

The federal government's direct orders and subsidies spurred the hardrock mining industry into what was the greatest periods of the industry's expansion in the shortest possible time. Providing immediate production, and lots of it, was the driving societal value. Generating GNP to deliver its brutal impact upon enemy nations was imperative. Indeed, *everyone* knew that American lives depended upon this industrial production, including the primary contribution of the hardrock mining industry. (Mining is referred to as being a "primary industry" for good reason!) Environmental values, as we now

[14] Obviously, the US could not duplicate these same achievements at this time.

understand them, were pushed to an obscure corner, or more typically, such values simply did not influence federal decision-making whatsoever.

Perhaps, no single visual image captures the difference in attitudes between this period and the present than the 1943 Pennsylvania Railroad calendar art by Dean Cornwell showing a PRR steam locomotive highballing past a massive steel mill belching fire and smoke, a munitions train on the foreground track, full coal hopper cars in the background and a pile of iron ore set to be charged into the steel production furnaces. Uncle Sam looms huge in the background, rolling up his sleeve to get down to work. There is no mistaking the message, even in 2017. In 1943, the Pennsylvania Railroad was proudly displaying the pollution it generated to help win World War II.

Nor did the post-WWII culture quickly change from its intense wartime focus on material production to the exclusion of other values. The Union of Soviet Socialist Republics (USSR), a World War II ally, immediately became the new "Cold War" enemy. Additionally, Communist China, also a then-recent WW II ally became a frightening new enemy in very real "hot" war in Korea in 1950. The Soviet Union's surprisingly swift development of nuclear weapons only exacerbated US concerns. Not only were many WWII attitudes of the USA about the production ethos maintained, but indeed many of the WWII industrial and mineral production subsidies were maintained through the Korean War, and for some time thereafter. Indeed, the most far-reaching federal statute explicitly supporting U.S. mineral production was passed during this period, i.e., the U.S. Defense Production Act of 1950.

If a town was in the way of the growth of mine production, then the town had to move, in whole or in part, as witnessed, e.g., at Butte, Montana or at Bingham Canyon Utah. Other values, be they cultural or environmental, were secondary to overall societal production needs. And, indeed, the core values of production, employment and prosperity continued well into the 1960s.

> In the 1960s, before the crises of energy shortages, sprawl, air and water pollution, and post-industrial economic restructuring gripped urban and rural places across America, unlimited growth was a primary goal of many communities. Growth, both economic and demographic, was a mark of progress, a source of pride, and a centerpiece of many communities' identifies.

Greenow, Linda, 2004, "When Growth was Good: Images of Prosperity in Mid-Twentieth Century America, Middle States Geographer, 2004, 37:pp. 53-61, p. 53.

In short, the current culture of the USA has embedded environmental values into all aspects of policy-making. In contrast, "The Greatest Generation" had no such luxury in the 1930s, 1940s or 1950s. The 1960s reaction to such attitudes is understandable. However, it is not only the hardrock mining industry that had to change and incorporate such values, it was society as a whole that had to make these changes. And, such

changes, did in fact occur, in the public, the government, and the hardrock mining industry.

4.3 Cultural Balance

Fear of unemployment, fear of war, and fear of losing wars were all factors that pushed the United States far into the public policy mode of production-at-all-costs during most of the Twentieth Century. Environmental values were almost entirely ignored regarding industrial production until 1970. Indeed, such values were rarely even articulated. At the time, the pendulum had swung too far in the direction of industrial production at all cost, which led to unnecessarily high costs to natural and environmental values. However, times *were* changing in the 1960s and 1970s. With the prosperity of the 1950's and 1960's, other values could and did enter or re-enter the American culture ... including environmental values.

4.4 The Modern Environmental Movement

There is no single event that marks the beginning of the environmental movement, but there are a series of events that collectively altered the mix of cultural norms regarding jobs, production, pollution, and the environment. Concerns about nuclear arms and the effects from nuclear fallout (e.g., strontium 90) from bomb testing raised consciousness about the "environment" in the 1950s. The controversy surrounding the proposal of several major dams on the Colorado River system provided a focus for environmental values in the late 1950s, perhaps most notably the work of the Sierra Club and David Brower to help thwart the building of the Echo Park Dam in Dinosaur National Monument. The 1962 publication of Rachel Carson's controversial book *Silent Spring* provided a counterpoint to the widespread use of chemicals in the U.S. and Dupont's "better living through chemistry" message. Shortly thereafter, changing values and changing politics allowed the passage of the landmark Wilderness Act of 1964. All of these and many other factors brought changes to America's culture and values.

America reached a symbolic turning-point on April 22, 1970, celebrated by the first Earth Day. The advent of the modern environmental movement was to generate major changes for the U.S. hardrock mining industry, and indeed, all of US industry, manufacturing, state and municipal government pollution. However, these changes were certainly not immediate, and many of the changes most applicable to hardrock mining, reclamation, environmental protection and financial assurances would take decades to develop and implement.

4.5 Cultural and Legal Changes Incorporating Environmental Values

The above discussion is provided to emphasize the extent and rapidity of the change in societal values that caught both government and industry off-guard in the 1970s. Prior to 1970, there was very little regulation of government or industrial pollution. Often, there was no regulation of pollution whatsoever. Even worse, the USA's pre-1970 values and norms were such that environmental values were not significantly impacting societal

decision-making in any way, because much of society did not even understand there was another way of conceiving of the world. In fact, it was only late in 1969 that the US enacted the National Environmental Policy Act of 1969 (NEPA), which was the forerunner of most modern federal environmental statutes.

Accordingly, there is nothing that can be learned about the effectiveness of current hardrock mine regulation by studying facilities that were designed or constructed prior to 1970. These facilities were designed, built and operated to maximize production and minimize cost, but hardrock mines permitted/approved after 1990 have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard, as required by current law and mining industry attitudes.

Importantly, as discussed immediately below, even though laws and attitudes were changing rapidly starting in the 1970s, there was certainly a very steep "learning curve" as both government and industry tried to cope with challenges of a sort that never had had to be addressed previously. This transition was hard for all concerned, and mistakes were made. For example, the infamous "Syringe Tide" of raw garbage and medical waste washed up onto New Jersey and Long Island beaches as late as 1988-1989 highlighted on-going municipal waste disposal practices, and indeed, well into the 1990s, New York City and various New Jersey communities were still ocean-dumping sewage sludge in the New York Bight and raw sewage via storm water overflow.

Fortunately, the Hardrock Mining Industry's transition problems was largely complete by 1990, and since 1990 environmental problems associated Hardrock Mining have been generally modest and manageable, as benchmarked, in part, by the lack of any new Western hardrock mines appearing on the CERCLA National Priorities List in the last 26 years.

Section 5.0, immediately below, provides a summary of the major environmental regulatory programs that have created the regulated hardrock mine era.

5.0 Development of Legally-Applicable Hardrock Mine Regulation

5.1 Regulation of the Natural Media Receptors – An Overview

Fundamentally, there are four major categories natural media that the environmental laws protect: (1) air; (2) surface water; (3) groundwater, and (4) land. As a practical matter, hardrock mining has not typically triggered significant scientific, policy or regulatory questions regarding air quality; therefore, this study does not evaluate hardrock mine regulation regarding protection of air quality.[16] Surface water quality protection has been

[16] For example, the only significant air quality policy issue that has arisen from hardrock mining concerns the emissions of mercury from gold mining operations in Nevada impacting Idaho dam-impounded reservoirs. However, these allegations were effectively discredited by the White Paper developed by the Idaho Association of Commerce and Industry/Idaho Council for Industry and the Environment Report "Sources and Receptors of Mercury in Idaho," January 28, 2009 ("Idaho Mercury Report"). Mercury in Idaho's waterways is primarily a result of geologic source mercury or legacy mining (i.e., historic mining

dominated by promulgation of federal statutory and regulatory programs, which then have typically been implemented by state agencies. On the other hand, ground water quality protection has been the province of State government with some specific notable exceptions.

Regulation of direct impacts to land (i.e., "reclamation") has been almost exclusively the province of the relevant land management authorities. The regulation of hardrock mine reclamation on National Forest System lands has been administered by the USFS since 1974, the regulation of hardrock mining on Department of Interior managed public domain lands has been administered by the BLM since 1981, and the regulation of state and private lands within a state are administered by the relevant state agency. Additionally, the integration of post-mining land use, continued protection of water quality and post-mining land uses following hardrock mine closure and reclamation, as well as bonding for these purposes, has been the unique province and expertise of the State and Federal Land management agencies. A brief history of these programs is provided below.

5.2 Surface Water

The Clean Water Act[17] was passed in 1972 and, among other things, created a requirement for a discharger of a "pollutant" to "navigable waters" (which later came to be more broadly defined as "waters of the United States") from a "point source" to obtain an NPDES permit.[18] In theory, the Clean Water Act, most particularly the NPDES permit system was one of the first federal laws potentially directly implementing regulation of hardrock mines. However, implementation was slow as EPA and the mining industry grappled with new concepts, new operational issues, and new regulatory concepts, including but not limited to programmatic litigation (see e.g., *U.S. Steel Corp. v. Train*, 556 F. 2d. 822 (7th Cir. 1977), and major statutory amendments[19] to address these issues. Thus, EPA did not promulgate 40 C.F.R. 440, Subpart J, concerning "Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategory," some of the most common Hardrock Mines, until December 1982. 47 FR 54609, Dec. 3, 1982.

Therefore, prior to 1982, EPA and delegated State programs had attempted to enforce on a case-by-case basis an inflexible and absolute "no discharge" requirement that did not take into account net contributions of rain and snow which contributed to unrealistic environmental evaluations that significantly contributed to environmental problems at early Transition Era hardrock mines. Thus, the very first practical federal regulatory scheme specifically regulating hardrock mine surface discharges did not even exist until the very end of 1982. Not surprisingly, sorting out the implementation of the NPDES program did not occur overnight.

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using historic mineral extraction technologies and practices long abandoned). Neither the EPA, nor the NGO's, have ever responded to the Idaho Mercury Report in writing.

[17] Technically, the Clean Water Act is the Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500 (codified as amended at 33 U.S.C. Section 1251-1387.

[18] 33 U.S.C. Sections 1311(a), 1362(6), (7), (12), (14).

[19] 1977 Clean Water Act Amendments, Pub. L. No. 95-217, 91 Stat. 1581 (codified as amended in scattered sections of 33 U.S.C.)

5.3 Groundwater Protection at Hardrock Mines

5.3.1 State Protection of Groundwater at Hardrock Mines

Groundwater regulation is generally held to be the unique province of state government. Groundwater, unlike surface water, does not readily migrate across State borders. Thus, while the federal definition of "waters of the United States" has been construed broadly, it has not generally been construed to regulate groundwater. As the American Law of Mining states, "[t]he Clean Water Act makes a clear distinction between navigable waters on the one hand and groundwater on the other."[25]

Therefore, state hardrock mine regulation has emerged as the primary regulatory tool for preventing or otherwise regulating potential hardrock mining impacts to groundwater. However, these programs have been relatively recent developments (i.e., since 1990). For example, the Nevada "Mining Facilities" regulation explicitly protects against and regulates discharges to groundwater from mining facilities were promulgated on September 1, 1990.[26] And although Idaho's Ground Water Quality Plan became law in 1992,[27] it was not until 1997 that a detailed and comprehensive enforcement mechanism was promulgated. See IDAPA 58.01.11, 3-20-1997 ("Ground Water Quality Rule"). Alaska's Hardrock mine reclamation was codified and promulgated in 1991. Washington's Metal Mining and Milling Act protects against potential discharges to groundwater and was passed in 1994.[28]

Thus, comprehensive direct preventative regulation of potential groundwater impacts of hardrock mine regulation was only initiated in the 1990s.

5.3.2 Federal Protection of Groundwater at Hardrock Mines

The Clean Water Act regulates discharges from hardrock mines, to "waters of the United States," and as discussed above, this is generally limited exclusively to surface water discharges. Certain Federal programs, including the Safe Drinking Water Act,[29] the federal Resource Conservation and Recovery Act[30] and Uranium Mill Tailings Radiation Control Act of 1978[31] regulate specific, narrowly defined activities potentially relevant to hardrock mines. The federal public lands agencies (i.e., the Forest Service and the BLM) incorporate state groundwater standards into NEPA compliance and mitigation. Nevertheless, as discussed below, since these state programs were devised in the 1990s, even explicit federal incorporation of state groundwater standards did not provide significant preventative groundwater regulation until, at least 1990. EPA has confirmed this to be true.

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[25] 5 Am. L. of Mining Section 169.02[2][c] (2d ed.)
[26] NAC 445A.350 et seq.
[27] See Idaho Groundwater Plan, Section II-C, Senate Bill 1321 (1992).
[28] Wash.Rev.Code 43.21.
[29] Safe Drinking Water Act, 42 U.S.C Sections 300 et seq.
[30] Resource Conservation and Recovery Act, 42 U.S.C. Sections 6901 et seq.
[31] Uranium Mill Tailings Radiation Control Act of 1978, 42 U.S.C. Section 7901 et seq.

EPA's assessment of groundwater protection at hardrock mine in 1985 was as follows:

> Ground-water monitoring is difficult, expensive, and has seldom been conducted at mine sites on a comprehensive basis. Because of complex geologic strata (presence of an ore body) and the extensive size of many mine properties, proper ground-water monitoring is technically difficult and costly. Historical practice in the mining industry has not required such monitoring. As a result, there is very little available information in the literature, and almost none on a complete or comprehensive basis. Most mines have no historical or contemporary ground-water monitoring information.

RTC I, p. 6-7 (emphasis in original). In short, as late as 1985 EPA asserts that groundwater protection at hardrock mine sites was virtually nonexistent. Thus, per EPA's own study of the hardrock mining industry, one cannot rationally gauge the current effectiveness of hardrock mine regulation regarding groundwater protection with reference to sites designed and approved before 1985.

Accordingly, in the 1980s, federal regulation hardrock mining for protection of groundwater was limited, and virtually non-existent. This left the subject of groundwater regulation at hardrock mines to the state governments. The Western States stepped-up to manage this area in the 1990s, generally as part of mining specific statutes or regulations, and eventually tied directly to hardrock mine reclamation programs and financial assurance requirements.

5.4 Hardrock Mine Reclamation, Financial Assurances and Water Quality Protection

In 1974, the Forest Service promulgated regulations governing reclamation and performance bonding of hardrock mines on National Forest System Lands.[32] These were some of the first regulations governing Hardrock Mine reclamation promulgated by any agency, federal or state. In 1981, the BLM promulgated the surface management regulations applicable to Mine Plans of Operations ("MPOs") similar in concept to those of the Forest Service. The history of the impact and evolution of these programs is described in greater detail by Northwest Mining Association's "The Evolution of Federal and Nevada State Reclamation Bonding Requirements from Hardrock Exploration and Mining Projects: A Case History Documenting How Federal and State Regulators Used Existing Regulatory Authorities to Respond to Shortcomings in the Reclamation Bonding Program," prepared by Jeffrey V. Parshley and Debra W. Struhsacker, January 2008. That study documents federal and state interagency and industry cooperation by which hardrock mine regulation worked to create the currently effective hardrock mine regulation in Nevada; however, a similar history is reflected in most of the western mining states, as discussed above.

[32] 36 CFR Part 228 (2016).

However, hardrock mine regulation is certainly not only about the Forest Service and the BLM. The Western States have regulated hardrock mining for decades. For example, both Idaho and Colorado had mined land reclamation programs that dated back to the 1970s. Initially these programs, like those of the Forest Service and the BLM focused on regrading and revegetation of mined lands, and not on surface water quality and certainly not ground water protection. Indeed, initially, the Forest Service deferred protection of surface water to EPA enforcement of the Clean Water Act and EPA oversight of delegated state Clean Water Act programs, which gave rise to two of the most notorious hardrock mine regulatory failures during the Transition Era (1970-1990), specifically Summitville, Colorado and Zortman, Montana. Thus, it became clear to the BLM, the Forest Service and the Western States that closure, reclamation, post-mining land uses and water quality had to be integrally-related and "bonds" posted.

Accordingly, the current reclamation bonding programs are working very well. Not only are Regulated Hardrock Mines (i.e., post-1990) avoiding EPA CERCLA National Priorities List, but even more importantly, existing financial assurances (federal and state) are avoiding public liability, even when defaults have occurred. For example, in the co-authors' home states of Idaho and Nevada, there has never been a Hardrock Mine that was approved and for which financial assurances were posted that defaulted on the financial assurances such that the Mine was not closed and reclaimed in accordance with: (1) the reclamation/closure plan approved by the relevant federal and/or state agencies; and (2) the financial assurances retained by the agencies. This is discussed in greater detail below.

In Idaho, two relatively large hardrock mines in Idaho defaulted on their bonds in the 1990s such that the public agencies had to rely on financial assurance monies to close and reclaim the properties. Even though both mines dated from the Transition Era (i.e., pre-1990), in both situations (specifically, Dakota Mines-Stibnite and Black Pine), the bond amounts proved to be adequate. Interestingly, these two mines had been identified by Earthworks' (one of the CERCLA 108(b) plaintiffs) as being insufficiently bonded.[33] Earthworks was wrong, by a factor of ten. More specifically, Earthworks' stated that adequate bonding for each of these mines would be about $50,000 per acre; in fact, Dakota Stibnite and Black Pine were closed and reclaimed for $2,710 per acre and $7,383 per acre respectively.[34] In short, it is objectively demonstrable that any factual assertions by Earthworks are insufficiently grounded to be given serious consideration in any EPA rulemaking.

Nevada has the nation's largest and arguably the most successful state hardrock mine environmental closure and reclamation program. In part because it started later, Nevada developed water quality protection and land reclamation into an integrated and "bonded" hardrock mine program, essentially from the beginning. Nevada's "Mining Facilities" regulations protecting waters of the state (surface and groundwater) were promulgated in 1989, and then in 1990 the Nevada legislature passed the Nevada Reclamation Act. In

[33] Letter, Baird Hanson William LLP to USFS Salmon-Challis Nation Forest, May 24, 2007

[34] Thus, Earthworks and their NGO colleagues have been are fully informed of the adequacy of existing hardrock mine financial assurances for 20 years.

the mid-to-late 1990s, two permitted mines (Goldfields and Mt. Hamilton) defaulted on their "bonds," which were adequate but not immediately available for necessary water system management. This prompted voluntary efforts on the part of the Nevada mining industry to act to prevent any interim spills and this caused the Nevada Mining Association to seek a change in Nevada law to allow for immediate NDEP access to "fluid management bonding." This problem has never recurred.

Thus, every Idaho and Nevada hardrock mine (including those that have been in default) that was approved and subject to financial assurances has been closed and reclaimed in accordance with: (1) the reclamation/closure plan approved by the relevant federal and/or state agencies; and (2) the financial assurances retained by the federal and/or state agencies.

Once states and/or federal land management agencies (i.e., the Forest Service and the BLM) integrated mine reclamation with surface water and ground water protection, geochemical prediction and financial assurance for such activities and related predictions, the chances of such facilities replicating the problems that arose in the Pre-Regulatory Era (Per-1970) became essentially impossible to duplicate ... and, indeed, such problems have not been recreated to date.

Thus, certain Transition Era (1970 through about 1990) hardrock mines created problems. There is no question there has been a "learning curve." State agencies began to create active groundwater management programs regulating hardrock mines that might impact ground water. And, the Forest Service and the BLM began to work in concert with the relevant states, as all parties sought to incorporate comprehensive surface and groundwater protection into NEPA planning, Mine Plan of Operation approvals and reclamation bonding programs to create regulatory programs that prevented the creation of water pollution in the first place and bonded for such protection from the outset of mining operations. This took time, but it was achieved. And, the most important single element is that since 1990, design, permitting, construction, operation, closure and reclamation of hardrock mines are integrated.

Initially, Western States hardrock mine regulation was limited to regrading and re-vegetation, similar to the early Forest Service and BLM programs. However, after water quality impacts were identified famously at hardrock mines at Zortman and Summitville, then the primary federal land management agencies (i.e., the Forest Service and BLM) shifted from reclamation as a merely regrading and revegetation exercise to comprehensive sustainable surface and ground water quality protection.

5.5 The National Environmental Policy Act of 1970

Nominally, the passage of the National Environmental Policy Act of 1969 (NEPA) was potentially applicable to hardrock mines and therefore could have heralded an immediate major shift in hardrock mine regulatory policy. In fact, initially, it did not. NEPA requires a "proposal" of a "major federal action" (including potentially approval of a

Mine Plan of Operation) "significantly affecting the environment."[35] Thus, NEPA regulation of hardrock mining typically is triggered by the filing of a request for an MPO with the Forest Service, the BLM or the EPA (for an NPDES permit). In fact, in the 1970's and 1980's there was significant state-by-state debate regarding whether the approval of a single hardrock mine constituted a "major" Federal action that was subject to NEPA, but it was not until 1995 that the first hardrock mine Environmental Impact Statement was issued in Nevada. Nevertheless, when it became clear that EPA and state NPDES jurisdiction could not adequately manage surface discharges as stand-alone issues at Zortman and Summitville, the Forest Service and the BLM used their Mine Plan of Operation approval processes to create comprehensive and integrated water quality protection for hardrock mines. Clearly, there were regulatory gaps that had to be addressed. This was part of the learning curve that delayed effective hardrock mine regulation until the 1990s. In fact, regarding current hardrock mine regulation, NEPA EIS evaluation of the environmental impacts and mitigation measures has become a major aspect of any hardrock mine approval with a federal nexus.

Nevertheless, prior to 1990, NEPA had little relevance to hardrock mine regulation.

5.6 Evaluation of the Effectiveness of Hardrock Mine Regulation based upon the Timing of Regulatory Developments

The above discussion provides a short jurisdictional history of the regulation of hardrock mining. To briefly summarize, there was literally no regulation and therefore no regulatory consideration of the environmental impacts of hardrock mining prior to 1970, so any site designed and constructed prior to this date provides no information about the effectiveness of hardrock mine regulation. NEPA was signed into law in 1970, but NEPA required other federal authorities and case law to be interpreted before NEPA could be implemented at hardrock mines. Accordingly, it is misleading, disingenuous, and certainly "arbitrary and capricious" to evaluate environmental issues associated with hardrock mines designed and operated prior to 1970 as examples of current hardrock mine regulation.

EPA's hardrock mine NPDES program was not published until 1982, and took years after that to properly implement the program. As discussed above, federal agencies were generally precluded from infringing upon state control of groundwater, and groundwater programs regulating hardrock mines were largely the product of the 1990s. Thus, it was not until the 1990s that federal and state agencies began to comprehensively address the water quality issues associated with hardrock mining.

EPA confirms this state of affairs when it stated in 1985 that:

> During active site life, during closure, and in the post-closure period, facilities could employ engineering controls to prevent erosion, to keep leachate out of the ground water, or to remove contaminants introduced into ground water. However, EPA data on management methods at mining

[35] American Law of Mining, Section 167.02.

> facilities indicate that only a small percentage of mines currently monitor their ground water, use run-on/runoff controls or liners, or employ leachate collection, detection, and removal systems. EPA has not determined the circumstances under which these waste measures would be appropriate at mine waste and mill tailing disposal sites.

RTC I, p. ES-10. It is only after 1990 that the lessons learned from the 1970 to 1990 Transition Era began to be more fully incorporated in the mine regulatory processes. Thus, it has only been in the last 20 years that hardrock mine permitting has first begun to more fully evaluate, predict and regulate long term water quality impacts.

The bi-partisan Western Governors' Association has characterized the situation as follows:

> ...
> 3. While older mines in western states have sometimes had harmful impacts on adjacent waters, the mining industry has improved its operation and reclamation track record in recent decades, to avoid or minimize such impacts.
> 4. Recent decades have also brought heightened attention to the importance of mine reclamation from state regulators across the west. All western states that host hardrock mining industries now have staff dedicated to ensuring that on-going mine operations develop and follow appropriate reclamation plans.

WGA, Policy Resolution 2011-4 (A)(3) and (4).

> All Western states have developed regulatory bonding programs to evaluate and approve the financial assurances required of mining companies. The states have developed the staff and expertise necessary to calculate the appropriate amount of the bonds, based upon the unique circumstances of each mining operation, as well as to make informed predictions of how the real value of current financial assurance may change over the life of mine, even post-closure.

WGA, Policy Resolution 2014-07 ("Bonding for Mine Reclamation"). In fact, the "bottom line" on the adequacy of hardrock mine regulation is fairly simple. Until changing societal cultural norms regarding environmental protection and Hardrock Mine regulation began to be implemented by federal and state regulatory agencies environmental problems arose. Since 1990 after federal and state agencies began paying attention with a degree of technical experience, the EPA has yet to designate even a single Western hardrock mine site to the National Priorities List.

The key to effective hardrock mine regulation is that there is *some* form of evaluation and planning. Neither the goals, nor the science, are that difficult to implement. It takes planning and application of existing knowledge. Almost all of the hardrock mines giving rise environmental problems on the CERCLA NPL arose when environmental goals and planning were nonexistent in the Pre-Regulatory Era (Pre-1970). And, while a few CERCLA NPL problems arose in the Transition Era (1970 through 1990) when practical experience was wholly-lacking, in the Regulatory Era (Post-1990) there have been no

Western hardrock mine sites that EPA has deemed to be a sufficient problem to require nomination to the National Priorities List.

6.0 Conclusion

The federal and state regulation of hardrock mining and milling facilities is a remarkable success story of changing law and policy environmental protection that is well-illustrated by the vintage of hardrock mines on the United States Environmental Protection Agency ("EPA") National Priorities List of environmental cleanup sites. To briefly summarize, there has never been an environmental problem at a Western hardrock mine that was approved by a federal or state agency in the West after 1990 that has required EPA to make such hardrock mine a Superfund "top priority among known response targets." To reiterate, no hardrock mine permitted in the West after 1990 has ever been placed on EPA's Superfund National Priorities List.

Current hardrock mine regulation on federal lands managed by the United States Forest Service and the Bureau of Land Management has been determined to be "complicated, but generally effective" by the federal government's independent National Academy of Sciences National Research Council in 1999. In 2011, Senator Murkoswki's investigation of the BLM and Forest Service mine regulation experience verified and updated the 1999 NAS/NRC determination. And, the Bi-partisan Western Governors' Association has stated that the Western states, which regulate Hardrock Mining on state and private lands within their borders "... impose permit conditions and stringent design and operating standards, to ensure that hardrock mining operations are conducted in a manner that is protective of human health and the environment" and that Western "... states have developed the staff and expertise necessary to calculate the appropriate amount of the bonds, based upon the unique circumstances of each mining operation, as well as to make informed predictions of how the real value of current financial assurance may change over the life of mine, even post-closure." WGA, Policy Resolution 10-16, Background (A)(8) ("National Minerals Policy"). Moreover, all programs of the federal and state agencies have continued to strengthen their reclamation and bonding programs on an ongoing basis.

The above-described regulatory success story is a direct result of society's change in values both outside of, and within, the hardrock mining industry to seek protection of the environment, not just to creates jobs, industrial production and tax revenue. Hardrock mines designed and built prior to 1970 were developed to maximize production and minimize cost with little or no regard for environmental values. After 1990, new hardrock mines have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard, as required by current law.

The above-described changes in values, law, design, permitting, operation closure and reclamation have had a major impact on the adequacy of financial assurances posted pursuant to routine individual financial assurances on a mine by mine basis. Using the co-authors' home states as examples, there has never been an Idaho or Nevada hardrock

mine for which financial assurances were posted that defaulted on the bonding such that the hardrock mine was not closed and reclaimed in accordance with: (1) the reclamation/closure plan approved by the relevant federal and/or state agencies; and (2) the financial assurances retained by the agencies. Thus, objectively, the existing regulation of hardrock mines is protecting the environment from releases and protecting public treasuries through posting of adequate financial assurances.

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MEMORANDUM

TO: Mr. Joe Baird – Baird Hanson LLP

FROM: Mr. Richard DeLong RFD

DATE: May 15, 2015

SUBJECT: Assessment of Mining and Milling Site on the National Priorities List

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At your request, Enviroscientists, Inc. (Enviroscientists) completed an assessment of the United States Environmental Protection Agency's (EPA's) National Priorities List (NPL) for Mining and Milling Sites (MMS). A search of the NPL was completed on April 21, 2015. See Attachment A for a printout of the list. In addition, a compact disk (CD) with the searchable excel version of the printout is included with is memorandum.

There are over 1,100 sites on the NPL. Of those, there are 100 that the EPA has classified as MMS. However, only 55 of those sites are actual mining operations where mineral resources were extracted from the earth. The other 45 are mineral processing facilities where a mineral product is delivered to the operation for further processing. The 55 "Hardrock Rock" MMS on the NPL fall into the following temporal classifications: 49 are prior to 1970; five are from 1970 through 1990; and one is post-1990. The one operation that was permitted and began operations post-1990 is the Barite Hill property in South Carolina. The operation was an open pit heap leach mine that ceased operation in 1995 and reclamation was completed in 1995 to 1999.

ATTACHMENT A

MAY 2013 VERSION OF THE MINING AND MILLING SITES ON THE NATIONAL PRIORITY LIST

Table 1

Summary - Mining and Milling Sites on the National Priorities L

Source: EPA AML - Status = "Final" as of May 2013 Update (list check April 21, 2

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	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 1970 - 1989 3 - 199 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
1	CALLAHAN MINING CORP	1	ME	1880's	1972	1972	1	M	Mining/milling (Open pit mine)	Zinc/copper	Final	MED980524128
2	ELIZABETH MINE	1	VT	early 1800s	1958	1958	1	M/O	Mining; copper smelting	Copper	Final	VTD988366621
3	ELY COPPER MINE	1	VT	1821	1920	1920	1	M/O	Mining/cobbing/roasting/smelting; (removal of ore)	Copper	Final	VTD988366571
4	PIKE HILL COPPER MINE	1	VT	1847	1919	1919	1	M	Mining	Copper	Final	VTD988366720
5	LI TUNGSTEN CORP.	2	NY	1940's	1984	1984	1	O	**Processing** (Received tungsten ore's for processing).	Tungsten	Final	NYD986882660
6	MAYWOOD CHEMICAL CO.	2	NJ	1916	1955	1955	1	O	**Processing** (radioactive thorium ore).	Thorium	Final	NJD980529762
7	SHIELDALLOY CORP.	2	NJ	1955	2006	2006	1	O	**Processing** (discharge to unlined pits prior to 1970 enforcment actions).	Chromium alloy	Final	NJD002365930
8	U.S. RADIUM CORP	2	NJ	1915	1926	1926	1	O	**Processing**/Tailings	Radium	Final	NJD980654172
9	W.R. GRACE & CO., INC./WAYNE INTERIM STORAGE SITE (USDO	2	NJ	1948	1971	1971	1	O	**Processing**/extraction	Monazite ore (thorium/rare earths)	Final	NJ1891837980
10	FOOTE MINERAL CO	3	PA	1942	1991	1991	1	O	**Processing**/Manufacture of metal products	Lithium	Final	PAD077087989

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11	FRANKLIN SLAG PILE (MDC)	3	PA	1950's	1999	1999	1	O	MDC Industries sold the **processing** slag as sand blasting grit for 40 years. MDL Abandoned site 12/30/1999. Franklin Smelting and Refining Co smelting the ore. (lead contamination)	Copper	Final	PASFN0305549
12	JACKS CREEK/SITKIN SMELTING & REFINING, IN	3	PA	1958	1977	1977	1	O	Smelting **processing** and precious metals reclamation	Precious metals	Final	PAD980829493
13	PALMERTON ZINC PILE	3	PA	~1912	1982	1982	1	O	Smelting **processing** (NJ Zinc Co.)	Zinc	Final	PAD002395887
14	U.S. TITANIUM	3	VA	1931	1971	1971	1	O	Refining **processing** titanium ore/Titanium dioxide manufacturing	Titanium	Final	VAD980705404
15	BARITE HILL/NEVADA GOLDFIELDS	4	SC	1991	1995	1995	3	M	Mining (gold plant, heap leach)	Gold, Silver	Final	SCN000407714
16	BREWER GOLD MINE	4	SC	1828	1995	1995	1,2	M	Mining - CN heap leach pad 1987 - 1995.	Gold	Final	SCD987577913
17	MACALLOY CORPORATION	4	SC	1941	1998	1998	1	O	Ferrochromium alloy **processing** plant	Ferrochromium	Final	SCD003360476
18	NATIONAL SOUTHWIRE ALUMINUM CO.	4	KY	1969	active	active	1	O	Aluminum **processing** (north pond)	Aluminum	Final	KYD049062375
19	ORE KNOB MINE	4	NC	1850s	1962	1962	1	M	Mining, roasting, smelting	Copper	Final	NCN000409895
20	STAUFFER CHEMICAL CO. (TARPON SPRINGS)	4	FL	1950	1981	1981	1	O	**Processed** elemental phosphorous from phosphate ore.	Phosphate	Final	FLD010596013

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21	ASARCO TAYLOR SPRINGS	5	IL	1911	active	active	1	O	Zinc smelting/**Processing** zinc oxide	Zinc	Final	ILN000508170
22	DEPUE/NEW JERSEY ZINC/MOBIL CHEMICAL CORF	5	IL	1903	1990	1990	1	O	Zinc smelting/**Processing**/Phosphate fertilizer	Zinc	Final	ILD062340641
23	EAGLE ZINC CO DIV T L DIAMOND	5	IL	1923	2003	2003	1	O	**Processing**/zinc smelting	Zinc/Cadmium	Final	ILD980606941
24	HEGELER ZINC	5	IL	1906	1954	1954	1	O	Zinc smelter/**Processing**	Zinc	Final	ILN000508134
25	MATTHIESSEN AND HEGELER ZINC COMPAN`	5	IL	1858	1978	1978	1	O	Zinc Smelter (smelter closed 1961)/ **Processing**	Zinc	Final	IL0000064782
26	ORMET CORP.	5	OH	1956	2005	2005	1	O	Aluminum reduction (unlined pits closed 1981)/ **Processing**	Aluminum	Final	OHD004379970
27	TORCH LAKE	5	MI	1890	1969	1969	1	M	Mining (copper mines dumped tailings into lake).	Copper	Final	MID980901946
28	U.S. SMELTER AND LEAD REFINERY, INC	5	IN	1920	1985	1985	1	O	Smelter/**Processing**	Lead	Final	IND047030226
29	CHEVRON QUESTA MINE (MOLYCORP)	6	NM	1920	Active (underground blockcave 1983 to present)	active	1,2	M/O	Mining/Milling	Molybdenum	Final	NMD002899094
30	CIMARRON MINING CORP.	6	NM	1960	1982	1982	1,2	O	Milling	Iron; Precious metals	Final	NMD980749378
31	HOMESTAKE MINING CO.	6	NM	1958	1990	1990	1	O	Milling	Uranium	Final	NMD007860935

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32	TAR CREEK (OTTAWA COUNTY)	6	OK	1850	1970s	1970	1	M	Mining district	Iron, Zinc	Final	OKD980629844
33	TEX-TIN CORP.	6	TX	1941	1989	1989	1	O	Smelter/Processing	Tin, Copper	Final	TXD062113329
34	TULSA FUEL AND MANUFACTURING	6	OK	1914	1925	1925	1	O	Smelter/Roaster/Processing	Zinc/lead	Final	OKD987096195
35	UNITED NUCLEAR CORP.	6	NM	1967	1986	1986	1,2	M/O	Mining/Processing/milling	Uranium	Final	NMD030443303
36	ANNAPOLIS LEAD MINE	7	MO	1920	1940	1940	1	M	Mining	Lead	Final	MO0000958611
37	BIG RIVER MINE TAILINGS/ST. JOE MINERALS CORP.	7	MO	1700's	1972	1972	1	O	Tailings disposal for lead mining	Lead	Final	MOD981126899
38	CHEROKEE COUNTY	7	KS	~1870	1970	1970	1	M	Mining (a/k/a Tri-State mining district)	Lead, zinc	Final	KSD980741862
39	MADISON COUNTY MINES	7	MO	1700's	1970s	1970	1	M	Mining (mining district)	Lead	Final	MOD098633415
40	NEWTON COUNTY MINE TAILINGS	7	MO	~1850s	1950	1950	1	M	Mining (Tri-State Mining District)	Lead, cadmium, zinc	Final	MOD981507585
41	OMAHA LEAD	7	NE	1870s	1996	1996	1	O	Smelting/Processing	Lead	Final	NESFN0703481

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42	ORONOGO-DUENWEG MINING BELT	7	MO	1848	late 1960s	1967	1	M	Mining (Tri-State Mining District)	Lead, cadmium, zinc	Final	MOD980686281
43	SOUTHWEST JEFFERSON COUNTY MINING	7	MO	early 1800s		1975	1	M/O	Historic mining district, smelting	Lead, zinc, barium	Final	MON000705443
44	WASHINGTON COUNTY LEAD DISTRICT - FURNACE CREEK	7	MO	1799	1980s (historic)	1980	1	M/O	Mining, milling, smelting	Lead, barite (barite 1926 - 1980s)	Final	MON000705842
45	WASHINGTON COUNTY LEAD DISTRICT - OLD MINES	7	MO	1700s		1980	1	M/O	Mining, milling, smelting			MON000705027
46	WASHINGTON COUNTY LEAD DISTRICT - POTOSI	7	MO	1700s		1980	1	M/O	Mining, milling, smelting			MON000705023
47	WASHINGTON COUNTY LEAD DISTRICT - RICHWOODS	7	MO	1700s		1980	1	M/O	Mining, milling, smelting			MON000705032
48	ACM SMELTER AND REFINERY	8	MT	1892	1972	1972	1	O	Smelting, refining/**Processing**	Copper, zinc	Final	MTD093291599
49	ANACONDA CO. SMELTER	8	MT	late 1800s	1980	1980	1	O	Smelting/**Processing**	Copper	Final	MTD093291656
50	BARKER HUGHESVILLE MINING DISTRICT	8	MT	1879	1970s	1970	1	M	Mining (only brief activity in 1940s, 1920s, and 1960s)	Silver, lead	Final	MT6122307485
51	BASIN MINING AREA	8	MT	late 1800s	1960s	1960	1	M	Mining (intermitent into 1960s)	Precious metals	Final	MTD982572562

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52	CALIFORNIA GULCH	8	CO	1895 (Yak Tunnel	Early 1980s	1980	1	M	Mining, processing, smelting	Gold, silver, lead, zinc	Final	COD980717938
53	CAPTAIN JACK MILL	8	CO	1860	1992	1992	1	M	Mining, milling	Gold, silver	Final	COD981551427
54	CARPENTER SNOW CREEK MINING DISTRICT	8	MT	1880s	1931	1931	1	M	Mining (last mine closed 1931 with intermittant mining after that)	Silver, lead, zinc	Final	MT0001096353
55	CENTRAL CITY, CLEAR CREEK	8	CO	1880s	active (limited)	2011	1	M	Mining District, any current operations small) (Includes Argo Tunnel draining 30+ inactive mines)	Gold	Final	COD980717557
56	DAVENPORT AND FLAGSTAFF SMELTER:	8	UT	1870	1875	1875	1	O	Smelting/Processing	Lead, silver	Final	UTD988075719
57	DENVER RADIUM SITE	8	CO	1915	1920s	1920	1	O	Processing (35 sites of Ra disposal)	Radium	Final	COD980716955
58	EAGLE MINE	8	CO	1880s	1984	1984	1	M	Mining	Gold, silver	Final	COD081961518
59	EAST HELENA SIT	8	MT	1888	2001	2001	1	O	Smelter/Processing	Lead, zinc	Final	MTD006230346
60	EUREKA MILLS	8	UT	1870	1958	1958	1	M/O	Mining and Milling	Gold, silver, lead, copper, arsenic	Final	UT0002240158
61	FLAT CREEK MM	8	MT	1909	1953	1953	1	M/O	Mining and Milling	Silver, gold, copper, zinc, iron	Final	MT0012694970

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62	GILT EDGE MINE	8	SD	1876	1998	1998	1,2	M	Mining (1986 DENR permit for open pit with CN heap leach operations).	Gold, copper, tungsten	Final	SDD987673985
63	INTERNATIONAL SMELTING AND REFINING	8	UT	1910	1972	1972	1,2	O	Smelter/Processing	Copper, lead, zinc	Deleted (10/11/2011	UTD093120921
64	JACOBS SMELTER	8	UT	1870s	1970	1970	1	O	Smelting/Processing	Silver	Final	UT0002391472
65	LIBBY ASBESTOS SITE	8	MT	1920 - start of large scale mining	1990	1990	1	M	Mining	Vermiculite	Final	MT0009083840
66	LINCOLN PARK (Cotter Mill, Canyon City, Colorado)	8	CO	1958		1979	1	O	Milling	Uranium, vandadium	Final	COD042167858
67	MIDVALE SLAG	8	UT	1871	1971	1971	1	O	Smelting/MillingProcessing	Lead, copper	Final	UTD081834277
68	MILLTOWN RESERVOIR SEDIMENTS/Clark Fork	8	MT	1870s	1980	1980	1,2	M	Mining and Smelter (possible source of As also could be landfill as source) (120 miles of sediments above reservoir)	Copper	Final	MTD980717565
69	MONTICELLO MILL TAILINGS (USDOE)	8	UT	1942	1960	1960	1	M	Milling	Vanadium, uranium	Final	UT3890090035
70	MOAAT INDUSTRIES	8	MT	late 1950s	1973	1973	1	O	Processing	Chromium	Final	MTD021997689

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71	NELSON TUNNEL/COMMODORE WASTE ROCK	8	CO	1889	1985 (historic hard rock mine)	1985	1,2	M	Mining	Silver, lead, zinc	Final	CON000802630
72	SILVER BOW CREEK/BUTTE AREA	8	MT	~1870s	1963	1963	1	M	Mining, milling and smelting (contamination of 24 stream miles by industrial, ag, and municipal)	Copper	Final	MTD980502777
73	STANDARD MINE	8	CO	1874	1974	1974	1	M	Mining	Silver	Final	CO0002378230
74	SUMMITVILLE MINE	8	CO	1870	1992	1992	1,2	M	Mining (1984 - CN Heap Leach)	Gold, silver	Final	COD983778432
75	U.S. MAGNESIUM	8	UT	1972	Active	2013	1,2	O	**Processing**	Magnesium (from brine)	Final	UTN000802704
76	UPPER TENMILE CREEK MINING AREA	8	MT	1870	1930s	1930	1	M	Mining district	Gold, lead, zinc, copper	Final	MTSFN7578012
77	URAVAN URANIUM PROJECT (UNION CARBIDE CORP.)	8	CO	1912	1984	1984	1,2	O	**Processing**	Radium, uranium, vandaium	Final	COD007063274
78	VASQUEZ BOULEVARD AND I-70	8	CO	1870s	1950s	1950	1	O	Smelting (smelting center for Rocky Mountain west)/ **Processing**	Gold, silver, copper, lead, zinc	Final	CO0002259588
79	ATLAS ASBESTOS MINE	9	CA	1963	1979	1979	1	M/O	Mining/Mill	Asbestos	Final	CAD980496863

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80	CARSON RIVER MERCURY SITE	9	NV	late 1800s	~1950s (sporadic small mining after this)	1950	1	O	Milling(multiple mills (75) along Carson River; used Hg amalgam reactions)	Gold, Silver	Final	NVD980813646
81	IRON KING MINE - HUMBOLDT SMELTER	9	AZ	late 1800s, 1906	1969 (mining, 1960s (smelter)	1969	1	M/O	Mining, smelter/**Processing**	Lead, gold, silver, zinc, copper	Final	AZ0000309013
82	IRON MOUNTAIN MINE	9	CA	1860s	1963	1963	1	M	Mining	Silver, gold, coper, zinc, iron	Final	CAD980498612
83	KLAU/BUENA VISTA MINE	9	CA	1868	1970	1970	1	M/O	Mining, milling	Mercury	Final	CA1141190578
84	LAVA CAP MINE	9	CA	1861	1943	1943	1	M	Mining (historical CN plant)	Gold, silver	Final	CAD983618893
85	LEVIATHAN MINE	9	CA	1860s	1962	1962	1	M	Mining	Sulfur	Final	CAD980673685
86	SULPHUR BANK MERCURY MINE	9	CA	1865	1957	1957	1	M	Mining	Sulfur, mercury	Final	CAD980893275
87	BLACK BUTTE MINE	10	OR	1890	1960s	1960	1	M	Mining	Mercury	Final	OR0000515759
88	BUNKER HILL MINING & METALLURGICAL COMPLEX	10	ID	1880s	1981	1981	1	M/O	Mining, milling, smelting**Processing**	Lead, zinc	Final	IDD048340921
89	COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	10	WA	1890s	1985 (smelter closed)	1985	1	O	Smelter (also pulp mill, and chemical industries)/ **Processing**	Lead, copper	Final	WAD980726368

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90	EASTERN MICHAUD FLATS CONTAMINATION	10	ID	1944	Active	2013	1	O	**Processing**	Phosphate	Final	IDD984666610
91	FORMOSA MINE	10	OR	1910	1937	1993	1	M	Mining	Copper, zinc, thorium	Final	ORN001002616
92	FREMONT NATIONAL FOREST/WHITE KING AND LUCKY LASS URANIUM MINES (USDA)	10	OR	1955	mid-1960's	1960	1	M	Mining	Uranium	Final	OR7122307658
93	KAISER ALUMINUM (MEAD WORKS	10	WA	1942	Active?	2013	1	O	**Processing** (Aluminum Reduction) (1942 - 1978 on site disposal of pot linings)	Aluminum	Final	WAD000065508
94	MIDNITE MINE	10	WA	1955	1981	1981	1	M	Mining	Uranium	Final	WAD980978753
95	MONSANTO CHEMICAL CO. (SODA SPRINGS PLANT	10	ID	1952	Active	2013	1	O	**Processing**	Phosphate	Final	IDD081830994
96	REYNOLDS METALS COMPANY	10	OR	1941	2000	2000	1	O	**Processing** (Primary Aluminum Reduction Plant)	Aluminum	Final	ORD009412677
97	SALT CHUCK MINE	10	AK	1915	1941	1941	1	M/O	Mining/Milling	Gold, silver, copper	Final	AK0001897602
98	TELEDYNE WAH CHANG	10	OR	1957	Active as of 2010	2013	1	O	**Processing**	Zirconium, rare earths	Final	ORD050955848
99	BLUE LEDGE MINE	9	CA	1904		1930	1	M	Mining	Copper/Zinc	Final	CAN000906063
100	NEW IDRIA MERCURY MINE	9	CA	1854	1970s	1970	1	M/O	Mining/**Processing**	Mercury	Final	CA0001900463

Technical Review of Kuipers Maest, 2006,"Comparison of predicted and actual water quality at hardrock mines: The reliability of predictions in Environmental Impact Statements"

June 28, 2013

Prepared for:

Northwest Mining Association.

Prepared by:

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1 EXECUTIVE SUMMARY

The purpose of this document is to assess the accuracy of statements and review conclusions made in the report entitled "*Comparison of Predicted and Actual Water Quality at Hardrock Mines – the reliability of predictions in Environmental Impact Statements" by Ann S. Maest and James R. Kuipers, et al., December 7, 2006* (the "Kuipers Maest Report"). The Kuipers Maest Report purports to provide an assessment of the adequacy of predictions made during National Environmental Policy Act (NEPA) processes at mine sites. The authors note it was ultimately "intended to advance the practice of science, engineering and regulation related to water quality prediction, the recognition of risk, and the application of effective mitigation to hard rock mines".

The review consists of a dual effort. One effort looked at the Kuipers Maest Report to determine whether the conclusions are supported by information contained in the report. It is important for scientific reviews to allow the reader to independently verify the methodology and data cited in support of the conclusions. The other effort looked beyond the Kuipers Maest Report for important information on the history of regulatory and scientific development that is completely absent from the report and also for information on actual conditions at the study mines. The history of regulatory and scientific development is then compared against the dates of preparation of the EIS studies cited by the report.

The review of the Kuipers Maest Report finds that:

- The conclusions contained in the report are not relevant to any current mines that are being permitted, or to any future mines. Modern-day characterization and analysis techniques have changed so radically from virtually all of the studies cited by the report that it is meaningless to draw any comparison to modern-day conditions.

- The conclusions regarding water quality exceedences cannot be validated. There are virtually no data presented that support the conclusions. Where data are available, the cited exceedences are often for internal and trigger monitoring points rather than for compliance points that affect the surrounding environment and receptors.

- The data set used in the report includes historical sites, which were developed prior to modern regulations. The study also includes a preponderance of mine sites that were studied and permitted during the transition period from un-regulated activity to modern regulation.

- The report draws conclusions based upon technical work that is old, and may no longer be technically supportable or valid. There is an under-representation of mine sites which have been studied, permitted, operated, and regulated using modern-day methods.

- The case studies examined by the current review indicate that the report has serious problems in the way that data are interpreted and in the way conclusions are drawn.

- Throughout much of the report, the cited data are discussed out of context and mostly in isolation. There is no attempt to understand the conceptual model, the hydrogeological and geochemical processes involved, or the site-specific nature and layout of the mine sites discussed. Consequently, much of the data interpretation and resulting conclusions are misleading.

- The report neglects that increasing data collection and improved models and predictive methodologies contribute to refinements in predictions and site conceptual models. This despite the authors acknowledging the same in their 2005 report on state-of-the-art of predictive methods wherein they include the quote: *"The site conceptual model must be representative of the most important processes and reactions that will occur over time on the mine site, and it can change with time at the mine site and as more information is collected" (Bredehoeft, 2005.)*

- The report has defined "impacts" differently from most regulatory bodies with which the mining industry has to comply. The report defines an exceedence of surface or groundwater quality as any parameter above a primary or secondary surface or groundwater drinking water standard regardless of whether it is in compliance with permit conditions or regulations.

- The report argues that many of the exceedences are due to "characterization failures". However, virtually all of the EISs for the study mines cited in the report were prepared prior to the BLM guidance for water resource and rock characterization and analysis.

- The report includes very little consideration of ambient hydrogeological conditions that were present prior to the development of the mining operation, and particularly cases where modern-day mining has cleaned up older mining operations.

- It is not possible to recreate the summary statistics cited in the report using the information provided for the case study mine sites.

- Scoring systems used in the report have unrealistically low criteria to define the severity of potential impacts

2 REGULATORY FRAMEWORK

Mining regulation and NEPA compliance by the agencies has evolved throughout the period of the Kuipers Maest Report and continues to evolve today. To consider how this might have affected the preparation of NEPA documents, the history of NEPA implementation in various agencies was examined along with other important regulatory developments. Table 2.1 shows important regulatory milestones.

As Table 2.1 shows, even though NEPA was signed into law in 1970, the Council on Environmental Quality (CEQ) did not issue its first regulations until 1978 and some of its most important guidance until 1983.

The Bureau of Land Management (BLM) issued general NEPA procedures in 1970 This guidance was somewhat out of context as the BLM did not fall under the Federal Land Policy and Management Act (FLPMA) until 1976. That act, among other things, directed BLM to undertake systematic planning for management of lands under its jurisdiction. The systematic planning involved all resources on BLM-managed lands, including mining operations. The Federal Land Policy and Management Act (FLPMA) thrust BLM into the NEPA compliance realm in a major way. It was not until 1988 that the BLM issued specific NEPA guidance addressing mining, among other subjects.

The Nevada BLM, recognizing the need for well-documented NEPA analyses and standardization of procedures, issued policies, and guidance on water resource data and analysis and rock characterization beginning in 1998. In addition, Nevada BLM first issued groundwater modeling guidance in 2008. Prior to1998 there was little to no standardization for these analyses. In recognition of the ever-advancing regulatory and technical framework, BLM updates these policies and guidance regularly.

The Forest Service issued NEPA implementation procedures in 1979. Their mining regulation practices continued to evolve and guidance on mine bonding was issued in 2004.

The Army Corps of Engineers has also undergone an evolving process for regulating activities in wetlands, which is the basis for their involvement in many mining sites. In 1987 the ACOE issued a manual for delineating wetlands. This was followed by an attempt to redefine the delineation procedure in a 1989 manual that was ultimately withdrawn and the 1987 manual reinstituted. The ACOE issued NEPA implementing regulations in 1988.

Prior to passage of the Clean Water Act in 1972, there was no prohibition on discharges to surface waters. Facilities constructed prior to this were not necessarily designed to prevent discharges to surface waters. The effluent limits for metal mines were not promulgated until December 1982.

Table 2.1 NEPA and Major Regulatory Milestones

Action	What	Date	Citation
NEPA becomes law	Federal Statute	1970	42 USC 4321
CEQ Related Activities			
CEQ authorized to issue non-binding regulations	Executive order	1970	
CEQ receives authority to issue regulations	Executive order	1977	
NEPA regulations	CEQ Regulation	1978	43 FR 55990
Forty Most Asked Questions published	CEQ Guidance	1981	46 FR 18026
CEQ Guidance on NEPA regulations	CEQ Guidance	1983	48 FR 34263
BLM Related Activities			
Department of Interior NEPA Procedures	Interior Department Guidance	1970	516 DM 1-7
Federal Land Policy and Management Act	Federal Statute	1976	43 USC 1701
BLM publishes NEPA Handbook	BLM Guidance	1988	BLM Handbook H-1790-1
Nevada BLM publishes Water Resource Data and Analysis Policy	BLM Policy	1998	Nevada BLM Policy
Nevada BLM publishes Rock Characterization and Water Resource Analysis Guidance for Mining Activities	BLM Guidance	1998	Nevada BLM Guidance
Nevada BLM publishes Groundwater Modeling Guidance for Mining Activities	BLM Policy	2008	Nevada BLM Guidance
Forest Service Related Activities			
National Forest Management Act	Federal Statute	1976	16 USC 1600
Forest Service NEPA implementation procedures	Forest Service Regulation	1979	44 FR 44718
Forest Service Reclamation Bonding guidance	Forest Service Guidance	2004	USDA Forest Service April, 2004
Army Corps of Engineers Related Activities			
Clean Water Act	Federal Statute	1972	33 USC 1251
Directive to protect wetlands	Executive Order	1977	Executive Order 11990
ACOE Wetland Regulations	ACOE Regulation	1977	
Wetlands Delineation Manual	ACOE Technical Manual	1987	US ACE Wetlands Delineation Manual, 1987
ACOE Procedures for Implementing NEPA	ACOE Regulation	1988	53 FR 3127
Other Related Developments			
Effluent limitations for metal mines promulgated under Clean Water Act	EPA Regulation	1982	47 FR 54609
CERCLA Enacted	Federal Statute	1980	42 USC 9601
SARA Enacted	Federal Statute	1986	42 USC 11001

Prior to the enactment of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980, there was little, if any, indication of groundwater standards developing under law. The SARA amendments in 1987 clarified that drinking water standards would be applied at CERCLA sites, indicating that avoiding discharges to groundwater was necessary to avoid CERCLA enforcement.

Thus, prior to 1972 for surface water, and 1987 for groundwater, there were no meaningful targets or limitations for mine designers to use for mitigation design, or for EIS evaluations to use for comparative purposes.

The point of this discussion is that NEPA compliance and mining regulation, while still evolving today, was in its infancy during the 1970s and 1980s. The mining industry and the principal Federal mining regulatory agencies (BLM, Forest Service, and ACOE) were working in an unsettled environment during this period, including rapidly changing statutes and regulations and rapidly evolving technical processes.

3 TECHNICAL FRAMEWORK

3.1 Background

The application of scientific hydrology studies to mine sites can be traced back to the 1950s. However, the majority of the work prior to the mid-1980s was focused on specific engineering issues that related mostly to mine dewatering or water supply. A real awareness of potential surface and groundwater contamination issues associated with industrial developments only started in the late 1970s and 1980s.

The United States and Canada were among the first countries to adopt environmental procedures for mine sites and other industrial developments. Mining companies typically started to employ on-site and corporate environmental officers from the late 1980s. However, many of the early mining environmental staff had limited technical background because of the inherent lack of experience associated with this new discipline.

In the 1990s, the hard rock mining industry became highly proactive in response to the increasing environmental regulation and guidelines, and rapidly developed in-house environmental expertise and corporate governance to a higher standard. The mining industry led the development of procedures and standards for surface and groundwater ahead of many other industrial sectors.

All of the major mining companies now have a high level of environmental awareness, both at a corporate level and at an operations level. In many countries, the environmental standards imposed on a project by the mining company itself are typically more rigorous than those demanded by local regulations.

Both hydrogeology and geochemistry models are only as good as input data available to represent the system under investigation. Development of a proper conceptual model is fundamental for any meaningful numerical analysis. Until the 1990s, the available input data for the predictive tools for estimating how rocks behave under weathering was based upon relatively crude test work with no real-world monitoring. The use of case studies and site monitoring experience to provide the ability to calibrate and validate modeling procedures within the past 10 years has been fundamental for establishing the current-day procedures.

The establishment of procedures by Federal and State regulators has only become commonplace since the late 1990s and early 2000s as a result of the improved technical understanding gained by the agencies. Most of the guidance for geochemistry testing for NEPA documents were developed starting in the late 1990s (Table 2.1).

As a result, scientifically-supported EIS documents have only been available since the mid to late 1990s. Many of the EIS studies that were carried out prior to the mid-1990s used procedures which are now superseded, and they did not include the concepts of uncertainty and mitigation. Therefore, it is only in the last 10 to 15 years or so that higher quality EIS studies have become available with substantially improved predictive protocols.

3.2 Hydrogeologic modeling

Current-day methods and procedures for predictive technical studies for mine sites are vastly different to those that were utilized ten or more years ago. Groundwater modeling codes were first developed in the 1980s but were not widely applied to mine sites until the late 1980s and early 1990s. There was virtually no groundwater modeling to support EIS documents until the early 1990s. Early groundwater models for mine sites were generally un-validated because of the lack of historic data to provide input or to calibrate the models. Furthermore, the early models were basic and did not focus on developing a proper conceptual model, and they did not typically include the present-day concepts of sensitivity, uncertainty and mitigation. It was not until the mid to late-1990s that representative groundwater models were applied in support of EIS studies, and the concept of uncertainty and mitigation was introduced into the forward model predictions.

3.3 Geochemical testing and modeling

A practical understanding of the environmental geology of mineral deposits has only really developed within approximately the last 15 years. A good knowledge of the geology is critical for achieving a realistic conceptualization of processes effecting surface and groundwater quality impacts, which the predictive studies are attempting to model. The early laboratory testing procedures for geochemistry characterization did not recognize some of the physical and chemical controls that are now known to influence the testing results, and therefore some the early laboratory results were poorly constrained.

Although procedures for geochemistry characterization and modeling were developed somewhat later than those for hydrology studies, they have also evolved significantly over the past decade as good validation data for the models have become available. The first site geochemistry characterizations that approached modern-day standards occurred in the mid-1990s. However, these early studies had no basis for comparing the theoretical laboratory characterization results with actual mobilization and transport of chemical constituents.

“Predicting Water Quality at Hard Rock Mines”, nominally a peer reviewed report on models, methods and state-of-the-art hydrological and geochemical prediction techniques, states “Predictive modeling of water quality at mine sites is an evolving science with inherent uncertainties” (Kuipers Maest, 2006). The report further notes the study brings together information on water quality predictions at mine sites with approaches developed primarily in the United States, Canada, and Australia, especially in the last 10 years.

This information is consistent with the Kuipers Maest Report (page 85), which states “EISs performed after about 1990 should have more reliable information on water quality impact potential than those EISs completed before this time” and “The availability of geochemical characterization data affects the ability to determine the potential for mines to release contaminants to water resources”. With this in mind, the evolution of the geochemical and hydrologic evaluations in earlier NEPA documents (late 1970s to early 1990s) would be expected to be less detailed and precise than an evaluation prepared for a mine after the mid-1990s.

At the Green’s Creek Mine, the 1983 EIS identified the potential for the project to degrade surface and/or groundwater as a result of potential acid drainage even though no specific geochemical testing was identified (USFS 1983). The 1992 Environmental Assessment (EA) for waste rock included metals analysis, acid-base accounting (ABA), synthethic precipitation leaching procedure (SPLP) and leachate modeling (USFS 1992). This testing indicated that some waste rock had the potential to produce acid, but a greater portion was acid neutralizing and no net acid production was expected. Waste rock leachate was predicted to have zinc concentrations in the range of 0.5 to 1.3 mg/l. The actual data discussion in the Kuipers Maest Report did not mention the waste rock leachate as being acidic. It did note the average zinc concentration was slightly higher than predicted at 1.65 mg/l. However, this number is in good agreement with the predictions and well below the discharge permit requirement (and secondary drinking water standard for zinc of 5 mg/l as identified in EPA, 2008).

At the Golden Sunlight Mine, despite a test indicating the ore may be acid generating, the ore body evaluated in the 1981 EIS was determined to be oxidized and common knowledge at the time was that oxide ores were non-acid generating. Therefore, no acid rock drainage (ARD) assessment or contingency plans for ARD were required by the state. According to Sandi Olsen (previously with Hard Rock Bureau of the MDEQ, personal communication 2004), Montana regulators started looking at ARD issues in about 1989 when the Golden Sunlight Mine planned to mine deep, low-grade, unoxidized ore. Subsequent evaluations correctly identified the high acid-generating potential of ore and waste rock.

3.4 Kuipers Maest Report and EISs

During the period from 1970 through the early 2000s, the passage of environmental laws lead to new regulations, which in turn spurred technical development that resulted in new regulatory guidance. It was a period of rapid (if uneven) change, which produced the current predictive modeling capabilities that are well-vetted, calibrated, and reproducible. It is likely that technical advances will continue.

Surface water quality standards were largely non-existent prior to 1972 and groundwater standards were similarly vague to non-existent until 1987. Development of predictive methodologies trailed behind these regulatory developments by 5 to 10 years. It was not until the late 1990s that predictive techniques were developed and standardized to a level that could be calibrated and verified. The Nevada BLM recognized this state of development in 1998 and began issuing guidance for technical analyses.

It is only in the last ten years or so that the mining industry has had the opportunity to monitor sites during operations and/or closure for which modeling predictions had previously been made, and therefore has had the opportunity to compare model results to reality. This has been fundamental to improving the methods and procedures for both the hydrogeology and geochemistry models to the current standard. Geochemistry databases and levels of practical understanding have only been sufficient to provide meaningful predictions since the early 2000s.

Because scientific study methods have evolved rapidly, and because the understanding of both mining operators and the regulators has greatly improved within the last 10 years or so, there is little to be gained by comparing the results of early EIS studies to actual conditions. Many mine sites have updated their previous studies, predictions, and mitigation plans using updated and more applicable analytical and predictive models. Therefore, comparison of the old EIS studies cited in the Kuipers Maest Report to actual operating conditions is misleading and is not useful for either the regulator or the general public.

There have only been a small number of new mines permitted since the adoption of modern-day procedures and standards. However, many mines are currently operating under the guidance of more recent supplementary NEPA studies or State-lead permitting, rather than the original EIS predictions. Virtually all of the mines that were cited as examples in the Kuipers Maest Report were permitted and constructed prior to the application of modern-day technical studies and modern EIS standards.

Many of the currently-operating mines in the United States and Canada are expansions of existing operations or re-development of existing Brownfield sites. In the majority of cases, the original mine development was carried out prior to the advent of baseline surface and groundwater studies, such that there is no proper baseline characterization of naturally elevated constituents, which commonly occur in the hydrologic system around mineralized areas. Many of the compliance exceedences cited in the Kuipers Maest Report are not valid because there are no baseline data upon which to compare the current conditions.

In fact, there are a large number of instances where comparatively recent mine expansions have helped the clean-up of historic sites as a result of the new standards imposed by the mining company itself. Any proper study on the environmental changes caused by mining would need to consider these aspects.

Of the 25 case studies used in the Kuipers Maest Report, only four sites were developed under current (post-1998) NEPA guidelines. The original EA and EIS documents for 21 of the case study sites were

not developed using currently-applied scientific procedures. The majority of the sites have been expanded and re-engineered since the original EIS, and the more recent studies and analyses supersede the original work that is cited in the Kuipers Maest Report. The Kuipers Maest Report has made no attempt to consider the updated environmental analysis associated with the expansions. The reason for this is not apparent as most of the data and more recent permitting documents are on file with the applicable Federal or State agency and are publically available.

Therefore, in summary:

- The Kuipers Maest Report draws conclusions based upon studies that are old and are no longer representative of current environmental permitting and predictive protocols,
- The Kuipers Maest Report makes some attempt to consider baseline conditions but rarely considers the fact that historic unregulated mining occurred at the sites,
- The Kuipers Maest Report makes no attempt to review updated studies and analysis that are publically available and supersede the original analyses,
- The Kuipers Maest Report does not include any evaluation of any EIS documents that were prepared using the modern-day rigorous analytical methods, which would be applied to any future mine development.

4 EVALUATION OF SUMMARY STATISTICS IN THE KUIPERS MAEST REPORT

4.1 Criteria used to select the case study mines

The Kuipers Maest Report contains a number of summary statistics to show the impact to surface and groundwater quality from mining. The statistics are based on the 25 case study mines, which were considered to be representative of "the distribution of general categories and water quality-related elements that are present in the larger subsets of hard rock mines in the United States". The authors note the 25 case study mines were chosen primarily due to the availability of water quality data for the "actual water quality" assessment. As stated on page 87 of the Kuipers Maest Report: "In making the final selection of mines for in-depth study, the following priorities were identified":

- Mines with long histories and NEPA documentation from new project to reclamation and closure.
- Mines with different proximities to water resources but indicating water quality impacts.
- Mines that conducted some geochemical testing, and if possible, some water quality modeling.
- Mines with different potentials to generate acid and leach contaminants to water resources.

The document also states the "list of mines that actually meet these criteria, particularly with respect to adequate reliable evaluations that have addressed water quality predictions and impacts, and are publicly available, is limited".

As noted above, it appears that including mines with water quality impacts was a priority, and the case studies were selected based on available water quality data. Therefore, the validity of the conclusions from the Kuipers Maest Report and their applicability to the mining industry in general is questionable.

4.2 Definitions

During analysis of the information to determine which mines had exceeded water quality standards, the Kuipers Maest Report used the following definitions:

Water quality impact: increases in water quality parameters measured anywhere, as a result of mining operations, whether or not an exceedence of water quality standards or permit levels has occurred.

Exceedence: (not specifically defined, but interpreted from the text as): any value above primary or secondary drinking water standards at any monitoring location within the mine property and/or within any facility (e.g., tailings solution, pit water, waste rock runoff).

These definitions are important because they are not put in context of the regulatory requirements.

The purpose of NEPA is to identify potential impacts (or effects) to the components, structures, and functioning of an affected ecosystem (NEPA Section 1508.8). Therefore, a significant effect in surface water or groundwater might be the change of classification or use of a stream or aquifer. This makes the definition used for water quality impact in the Kuipers Maest Report the most stringent imaginable. It does not take into account important facts such as whether the increase is within mining or process facilities or constitutes an environmental release, whether it results in an exceedence of a regulatory limit, or whether it results in any environmental impact (e.g., change in downstream water classification). It is a threshold so low that no significant human activity could avoid triggering it.

From a regulatory perspective, mines are required to meet water quality standards at points of compliance such as downgradient monitoring wells or the end of a surface or groundwater mixing zone. Only exceedences of standards or permit limits at or beyond the points of compliance are potentially significant from a regulatory perspective. "Exceedences" at arbitrary locations throughout the operation are not necessarily meaningful. No mention of site-specific points of compliance are made in the Kuipers Maest Report, rather all monitoring sites are considered equal. An "exceedence" would be very likely at any mine site using the definitions in the Kuipers Maest Report.

Additionally, primary and secondary standards in mineralized areas are often exceeded in baseline water quality data. The Kuipers Maest Report does consider baseline conditions. However, the discussion is peripheral and inconsistent (e.g., historic mining impacts are often not defined). "Exceedences" of standards are noted in the report even when they are attributed to baseline conditions.

4.3 Data used

The Kuipers Maest Report utilized data from the following sources:

- Operational and post-operational water quality information from old EISs, especially for the states of Alaska, Montana, and Idaho, where updated EISs were often available,
- Technical reports and water quality data from State agencies that regulate mining activities in states such as Arizona, California, Nevada and Wisconsin,
- Post-mining Engineering Evaluation/Cost Analysis (EE/CA) documents from NEPA documents from some mines (e.g., Beal Mountain, MT; Grouse Creek, ID),
- Water quality data from files at the State agencies or from reports written by agency personnel or mining company consultants for mines in Arizona, Nevada, California, and Wisconsin where situations with multiple EISs did not exist or the EIS documents did not address water quality impacts.

While the authors recognized "that additional insights might have been gained by analyzing additional water quality data for the various mine sites", their focus was "on obtaining data that was verifiable and/or otherwise contained in prepared reports as a matter of efficiency".

Unfortunately, with the exception of defining the NEPA document utilized in the evaluation, the sources of data cited are generic (e.g., NDEP water quality monitoring and compliance data 1999-2003) and few actual monitoring station designations or descriptions are included for specific data. As a result, no independent evaluation of the data is possible. Additionally, no agency contact names are provided, nor are mining company or consultant reports cited.

One of the basic principles of scientific work is that data and data sources must be cited to allow others to duplicate the work. Lacking these citations, the Kuipers Maest Report cannot be verified in any meaningful way.

4.4 Evaluation of summary statistics

4.4.1 Case study Mines

The Kuipers Maest Report indicated there were 183 modern era mines, with 137 of those subject to NEPA. Of those mines, 71 had EIS information (104 EIS/EAs). Twenty-five (25) mines were chosen as "case study" mines because of availability of data. This included one (1) mine in Alaska, four (4) in California, two (2) in Idaho, six (6) in Montana, seven (7) in Nevada, and one (1) in Wisconsin. The report concluded the results of detailed evaluation of the case study mines could be extrapolated to other operations.

Using Table 4.1 of the Kuipers Maest Report, the 183 mine sites were verified (no independent assessment of time of operation was conducted). Of those, it was also verified that 137 were subject to NEPA. Of those with NEPA requirements, Table 4.1 of the Kuipers Maest Report indicates NEPA documents for 78 sites were obtained, while the report text indicates 71 sites had NEPA documents that were obtained.

Table 4.1 Summary of information presented in Table 4.1 of the Kuipers Maest Report

State	# 1975-present (~2005) mines listed	% of total	Number of sites w/EIS documents	% of sites w/ EIS docs	No. of case study mines	% of case study mines
Alaska	8	4.4	7	9.0	1	4.0
Arizona	20	10.9	10	12.8	2	8.0
California	15	8.2	8	10.3	6	24.0
Colorado	9	4.9	-	-	0	0
Idaho	14	7.7	7	9.0	2	8.0
Michigan	1	0.6	-	-	0	0
Montana	15	8.2	13	16.7	6	24.0
Nevada	74	40.4	27	34.6	7	28.0
New Mexico	7	3.8	1	1.3	0	0
South Carolina	3	1.6	-	-	0	0
South Dakota	5	2.7	1	1.3	0	0
Utah	7	3.8	4	5.1	0	0
Washington	4	2.2	-	-	0	0
Wisconsin	1	0.6	-	-	1	4.0
14	**183**	**100%**	**78**	**100%**	**25**	**100%**

Table 4.1 provides a summary of information contained in Table 4.1 of the Kuipers Maest Report. According to the summary statistics gleaned from this table, California and Montana mines are over-represented while Nevada mines are under-represented. Of the 14 states listed, 7 states are represented in the case studies (50%). Of the 14 states listed, 9 were listed as having available NEPA documents (64%). One mine, Flambeau in Wisconsin, was included in the case studies, but the site was not listed in the mines with EIS documents obtained in Table 4.1. Since the discussion for Flambeau in Section 6.3.25 includes reference to the 1990 EIS, it appears the table is in error.

Table 4.1 shows significant over-representation of California and Montana mines. This leads to under-representation of mines in Nevada, by far the most active state for new mining projects (40.4% of all mines in the study), and the state where the BLM is very active in developing guidance for analysis of mining operations. The states that are over-represented in the study have long mining histories, and many of the modern mines are located within historic mining districts that have a long history of old and unregulated mining activity. Historical activities are an un-controlled variable that is not accounted for in the Kuipers Maest Report. Moreover, the report includes three CERCLA sites within the 25 case study

mines, which overstates the importance of old and "abandoned" sites and therefore skews the study results.

Considering the above statements, it is apparent that the Kuipers Maest Report has selected its study mines with significant bias towards old and unregulated sites. Therefore, it is not realistic to apply the conclusions of the report to current or future mining operations.

4.4.2 Surface and groundwater exceedences

Statements in the Kuipers Maest Report regarding the 25 case study mines include:

- 76% (19/25) had mining-related exceedences in surface water or groundwater
- 60% (15/25) had mining-related exceedences in surface water
- 64% (16/25) had mining-related exceedences in groundwater; 3 of the exceedences were related to baseline, therefore 52% (13/25) were related to mining impacts

These statistics appear to be the product of Table 7.1 of the Kuipers Maest Report: "EIS and Operational Water Quality Information for Case Study Mines." This table actually identifies 21 of the 25 mines as having water quality exceedences, but two of the groundwater exceedences (Round Mountain and Ruby Hill) are attributed to baseline conditions. Therefore, no mining-related water quality standard exceedences were identified at the following six mines: Round Mountain (NV); Mesquite (CA); Stillwater (MT); Castle Mountain (CA); American Girl (CA); and Ruby Hill (NV). Mines with violations or alleged violations noted in the text are more indicative of mines that have had compliance problems. Compliance problems at two of these sites (Zortman/Landusky and Beal Mountain) were a result of limited initial study. A total of nine (9) significant violations were noted which brings the percentage of mines with regulatory "exceedences" down to 36% (9 of the 25 mines).

A review of conclusions regarding actual and predicated water quality for each of the 25 case study mines described in Section 6.3 of the Kuipers Maest Report was conducted. For water quality, information from the description of Actual Water Quality Conditions for each mine was pasted into a table and the term "exceedence" or "violation" (if for water quality) was highlighted. Surface water and groundwater were differentiated in the table. Sources of information, as well as period-of-record, identified in the comparison are defined where available. The evaluation tables are provided as Appendix A. The result of this exercise is that the summary statistics could not be reproduced.

If such a study were to be conducted in the future, a more accurate and more realistic determination of water quality impacts from mines would involve reviewing data for compliance points to determine if there are exceedences. Judgment would be required because an occasional reported exceedence at a compliance point may not constitute an environmental impact (which is the purpose of reviewing projects under NEPA).

If the mines are separated by dates of initiation of mining, the percentage of case study mines with violations before 1970 is 100%, while those after 1990 is 0%. This is illustrated in Table 4.2.

Table 4.2 Violations/alleged violations at case study mines

Date	Name of Mine	Operations Started	Violation(s)/ Alleged Violations Noted*	Regulations Enacted
Pre-1970	Ray Mine, Arizona	1948	(2/2)	
	Bagdad, Arizona	1960	**100%**	
1970s	Black Pine, Montana	1974	(1/3)	NEPA (1970 Clean Water Act (1972)
	Round Mountain, Nevada	1977	**33%**	
	Zortman/Landusky, MT	1979		
1980s	Jerritt Canyon, Nevada	1980	(6/16)	
	Thompson Creek, Idaho	1983		
	Golden Sunlight, Montana	1983	**38%**	CEQ NEPA Guidance (1983)
	Jamestown, California	1983		
	Greens Creek, Alaska	1984		
	Grouse Creek Idaho	1984		
	McLaughlin, California	1985		
	Mesquite, California	1985		
	Stillwater, Montana	1986		
	Florida Canyon, Nevada	1986		
	Rochester, Nevada	1986		
	Twin Creeks, Nevada	1988		
	Royal Mt King, California	1988		BC Task Force – Acid Prediction Guidance (1989)
	Beal Mountain, Montana	1989		
	Mineral Hill, Montana	1989		
	American Girl, California	1989		
1990s	Lone Tree, Nevada	1991	(0/4)	
	Flambeau, Wisconsin	1991		
	Castle Mountain, California	1992	**0%**	
	Ruby Hill, Nevada	1997		

* Violations based on those alleged in the Kuipers Maest Report. No independent verification was conducted.

4.4.3 Contaminant leaching potential

The Kuipers Maest Report also defines the surface or groundwater exceedences by using the contaminant leaching potential described in one or more of the EISs, noting:

- 42% (8/19) predicted low contaminant leaching potential (but note that Table 7.1 only lists 5 (26%); 3 of the 8 included in the statistic are listed as “no information”)
- 42% (8/19) predicted moderate contaminant leaching potential
- 15% (3/19) predicted high contaminant leaching potential

The contaminant leaching potential is used in this context to describe the ability of any material (e.g., pit wall, waste rock, tailings) to leach constituents. Current practice is to determine leaching potential using geochemical tests and then to compare the test results with site monitoring data to determine the actual mobility of constituents. In the Kuipers Maest Report, qualitative or calculated predictions in the EISs

were scored. Qualitative statements were scored as stated on page 50: "if the EIS statement was somewhat negative (e.g., the potential for contaminant leaching exists), the entry was scored as a 2. If metals concentrations expected from mining operations were described as "low" or as not having significant increases over background/baseline concentrations, the entry was scored as a 1. For mines with multiple EISs, the EIS with the highest potential to generate contaminants was used as the score for the mine."

The contaminant leaching potential scoring system was defined as follows:

None - No information = 0

Low – leachate does not exceed water quality standards = 1

Moderate – leachate exceeds water quality standards by 1 to 10 times = 2

High – leachate exceeds water quality standards by over 10 times = 3

The following points were stated on page 50 of the Kuipers Maest Report:

- In the scoring, contaminant leaching potential was categorized according to the unit or material with the greatest potential to produce contaminants.
- The categories and factors chosen to score and describe contaminant leaching potential are not absolute in terms of potential environmental impact because different mines used different types of leaching procedures with different solid:liquid ratios (see Maest, et al., 2005) and different approaches to qualitatively describing the contaminant leaching potential.
- The potential for contaminant leaching is predicted without considering mitigation measures.
- The Environmental Protection Agency uses the toxic chemical leach procedure (TCLP) leachate standards for hazardous waste that are based on 100 times the drinking water standards. However, it is more appropriate to use the four categories listed above as a conservative approach (environmentally protective) to gain a rough understanding of the potential for contaminant leaching from mining waste.

Since none of the data are presented in the report, nor are calculations included, no reproduction of the scores is possible. Furthermore, a realistic review of the results is made difficult because of (i) the overly conservative definition of "exceedence", (ii) the lumping all EIS data together regardless of improvements in water quality/geochemical assessment or expanded requirements for characterization with time, and (iii) the expanded regulatory requirements through time. However, based on the scoring system presented and the stated disclaimers and assumptions (bullet points above), it is apparent that the Kuipers Maest Report uses overly-conservative scorings. It is also evident that the conclusions presented in the Kuipers Maest report do not rely on recognized or standard protocols for impact assessment and do not use points of compliance.

4.5 Summary

The evaluation of the summary statistics in the Kuipers Maest report can be summarized as follows:

- The Kuipers Maest Report defines an exceedence of surface or groundwater quality as any parameter above a primary or secondary surface or groundwater drinking water standard regardless of whether it is in compliance with permit conditions. This method makes it nearly impossible for any site with shallow groundwater or nearby surface water to not exceed standards.

- It is not possible to re-create the summary statistics cited in the Kuipers Maest Report using the information provided for case study mine sites.

- The general lack of citations for data sources or monitoring locations makes it difficult to confirm or deny conclusions reached in the report.

- Data from all NEPA documents are treated equally regardless of changes in scientific methods, regulatory requirements, or stated re-assessments of information; which is clearly not appropriate for a scientific study.

- Scoring systems in the document use uncharacteristically low criteria to define the severity of potential impacts

5 REVIEW OF CASE STUDY MINES IN THE KUIPERS MAEST REPORT

5.1 Background

The purpose of this chapter is to determine whether the Kuipers Maest Report accurately characterizes the actual impacts at mine sites that were used for the case studies. This current review selected four mines from the list of 25 case study mines to assess how the case studies were handled in the Kuipers Maest Report. The mines selected were: Golden Sunlight in Montana, Ruby Hill and Round Mountain in Nevada, and Flambeau in Wisconsin. The mines were selected to provide a temporal range of permitting and alleged compliance issues, and were also sites where data could be rapidly obtained for the purpose of review.

5.2 Golden Sunlight

Golden Sunlight is an operating mine located in Jefferson County, Montana. Two (2) Final EIS documents (1981 and 1998) and a Final EA (1990) were reviewed in the Kuipers Maest Report. Additionally, references to the 2005 Draft SEIS are made since both of the authors were involved in the Multiple Accounts Analysis (MAA) for this SEIS.

The Kuipers Maest Report concludes there was a failure in prediction of acid conditions based on the 1981 EIS. It is noted that the EIS document was compiled before the advent of standardized geochemical tests. The common and accepted knowledge at that time was that oxidized ores were not acid-generating (Sandi Olsen, former head of the Hard Rock Bureau, personal communication, 2004). The 1981 pit did not go below the water table and was developed in oxidized ore. As methodologies changed, more accurate predictions were made regarding the geochemical characteristics of the mined materials. Subsequent predictions at Golden Sunlight indicated a high potential for ARD and associated impacts and appropriate mitigation measures were implemented as a result.

5.2.1 Exceedences

The Kuipers Maest Report utilized data presented in the 1998 EIS (likely the 1997 Draft EIS, which contained the data). The following "exceedences" were defined in Section 6.3.14 of the Kuipers Maest Report. Additionally, actual impacts from the Appendix B tables (Table 14.1 for Golden Sunlight) are included.

- The Kuipers Maest Report notes "the primary source of existing groundwater contamination at Golden Sunlight is the tailings impoundment. The groundwater contains cyanide and copper concentrations above standards and has required numerous mitigations.

  Discussion: It is unclear which data were used from the 1997 Draft/1998 Final EIS, therefore it is difficult to comment on the accuracy of the statement. Volume 1 of the 1997 Draft EIS, page 158, under Evaluation of Historic Seepage Impacts to Current Groundwater Quality states "impacts to groundwater downgradient of the pumpback wells

after 1990 have been greatly reduced or eliminated". One graph of total cyanide and nitrate concentrations for downgradient monitoring location, OW-4, is presented in this section. No mention of copper could be found in relation to groundwater monitoring points downgradient. Based on information in the 2011 Annual Report, copper concentrations are reduced to levels below any standard downgradient of the pumpback system indicating the pumpback system is functioning properly. The point-of-compliance for the minesite is at the downgradient end of the mixing zone, where no exceedences of any constituent have been identified since the mixing zone was established.

- According to Kuipers Maest Report, monitoring of existing waste rock dumps showed sulfide oxidation and potential for acid drainage, with some piles already producing acid drainage. Evidence shows some springs on the project site were impacted, but larger impacts to groundwater or surface water from the waste rock dumps have not been evident to date.

  Discussion: In contrast to the above statement, page 141 of Volume 1 of the 1997 Draft EIS states "No ARD is currently discharging from the waste rock dumps". The discussion continues "However, monitoring of conditions in reclaimed dumps shows that the waste rock has the geochemical potential to generate ARD and that oxidation of sulfide minerals is presently occurring due to infiltration of moisture. Monitoring data suggest that a wetting front is migrating very slowly through the dumps. The slow rate of this migration is attributed in part to efforts to limit meteoric water run-on by upslope catchments and partly to geochemical reactions, which consume or dissipate water. At present, these processes appear to be effectively limiting the production of ARD at dump toes and, therefore, its potential migration and impact on the local environment."

  The spring(s) showing impacts from the waste rock dumps were not identified by the Kuipers Maest Report. Page 147 of the 1997 Draft EIS states "Several springs in the Golden Sunlight Mine project area have chemical compositions that are strongly influenced by ARD-like solutions and have some elevated concentrations of sulfate and trace metals. These springs are considered natural..." The Kuipers Maest Report may be referring to the Midas Spring which was described on page 154 of the EIS as an intermittent spring that was possibly associated with an abandoned adit. This spring was covered by the East Waste Rock Dump and seepage is captured and sent to treatment.

With respect to the summary information regarding Golden Sunlight in Appendix B, Table 14.1:

- **Tailings**: Predicted impacts to groundwater and surface water were listed as "slight" in the 1981 EIS (incorrectly identified as the 1983 EIS in this table), 1990 EA, and 1998 EIS. Actual Impacts for tailings were identified as:
  - 1990 EA: Contamination of cyanide and copper in downgradient wells
  - 1998 EIS: Continued contamination of cyanide and copper in dowgradient wells
  - Water Quality Monitoring: Capture not 100% efficient due to operational problems

  Discussion: The cyanide and copper contamination issue was previously discussed. Monitoring results in the 2010 Annual Report indicate a consistent downgradient decline in all constituents associated with the tailings impoundment release. The Montana DEQ routinely recommends 80% capture efficiency for predictions.

- **Waste Rock**: Potential impacts to groundwater and surface water, based on more accurate geochemical predictions of the 1990s, were considered significant. Mitigations were proposed for potential impacts, as required by NEPA. No actual impacts were

noted in the Kuipers Maest Report, although it was noted "springs near east waste rock dump and pore water in all waste rock dumps indicate long-term acid drainage and metals leaching impacts."

> Discussion: The impact to springs was previously addressed. The mine identified the waste dumps as having a high potential to impact surface and groundwater without mitigation. Therefore, the actual conditions are consistent with predicted conditions.

- **Open Pit**: The predicted impact to pit water was not considered in the 1981 EIS because the pit was above the water table. Subsequent EA/EISs predicted the pit water would be characteristic of ARD. The mitigation for the pit is pumping into perpetuity. Therefore, the actual impacts are the same as the predicted impacts.

5.2.2 Summary

In summary, for the Golden Sunlight Mine:

- Golden Sunlight prepared its first EIS in 1981, before the advent of standardized methods for the prediction of ARD and before the requirement for any extensive evaluations. The proposed pit was above the natural water table, and was in oxidized rock.
- Predicted impacts in subsequent EA/EIS documents correctly predicted the high potential for ARD generation and associated impacts to groundwater and surface water.
- No exceedences have occurred at the point-of-compliance for groundwater.
- No impacts to surface water quality have been identified.

5.3 Ruby Hill

The Ruby Hill mine is located in Eureka County, Nevada and has been in operation since 1997. An EIS was completed in 1997 and the Kuipers Maest Report summarizes the water quality predictions. Subsequently, an SEIS was completed in 2005 to predict potential impacts associated with deepening the pit below the groundwater table.

5.3.1 Exceedences

The Kuipers Maest Report noted that water quality monitoring and compliance data were obtained from the Nevada Department of Environmental Protection (NDEP) for the period 1997-2003. The 2005 DEIS (BLM, 2005) also summarized water quality at the site. Nine groundwater monitoring locations were noted for the site.

The following "exceedences" were alleged in Section 6.3.23 of the Kuipers Maest Report:

- "Only two constituents had substantially high concentrations: arsenic and nitrate. Two wells had high arsenic concentrations, often exceeding MCL values by two to four times; concentrations increased by about 20% between 1996 and 2003. However, the highest concentration occurred upgradient of the mine.
- Elevated pH values were also common in groundwater wells. Nitrate concentrations frequently approached the MCL in several wells. The 2005 EIS suggested these predated the mine and were due to septic systems. There were lead exceedences (less than twice the drinking water standard) during the fourth quarter of 1997 and the first

quarter of 1998 in monitoring well MW-4, although no problems were recorded after this point. Since the exceedences did not recur, it did not result in any action by NDEP.

Water quality impacts were not expected and did not occur. Therefore, assuming that the exceedences are related to baseline conditions, the water quality predictions were accurate.

Discussion: Underground mining has occurred in the vicinity of the Ruby Hill mine since the early 1900s. The long un-regulated history of underground mining activity in the Eureka Mining District has resulted in complex baseline water quality conditions at the site. The alleged exceedences do not substantiate any potential impacts due to recent mining activity because they did not recur and they were related to pre-existing groundwater conditions.

The 1997 and 2005 EIS documents provide a good characterization of the baseline conditions, and the Kuipers Maest Report supports that the predicted and observed conditions at the Ruby Hill mine were accurate. As a result of the predictions, mitigation measures were implemented successfully, and in a timely manner, to reduce arsenic concentrations in the dewatering discharge, thus facilitating use of the Rapid Infiltration Basins to return the water from the dewatering system back to the water resources of the Diamond Valley groundwater basin.

5.3.2 Summary

The Ruby Hill mine provides a good example of the current adequacy of the NEPA process with regard to EIS document preparation after the late 1990's.

5.4 Round Mountain

Round Mountain is an operating mine in Nye County, Nevada. The mine has been in operation since 1977 and EAs were completed for mine expansions in 1987 and 1992. The Kuipers Maest Report provides a summary of the water quality predictions that were reviewed for the 1996 EIS, which was conducted to support the mine milling and tailings expansions.

For the evaluation of actual water quality conditions, the Kuipers Maest Report utilized water quality monitoring and compliance data obtained from the Nevada Department of Environmental Protection (NDEP) for the period 1999-2003. Data from ten groundwater monitoring locations were reviewed for the site.

5.4.1 Exceedences

Exceedences of aluminum, fluoride, iron, lead, manganese, and TDS in groundwater were reported in Section 6.3.22 of the Kuipers Maest Report. The report states that: "the cause of the exceedences in groundwater is not known, but could be due to background groundwater quality and/or discharge from the tailings or heap leach facilities or dewatering water. Because the waste rock was shown to have a significant potential to leach contaminants, the fact that there is relatively little groundwater contamination indicates the mitigation may be working. However, there are trends that cannot be explained by assuming that all exceedences are background. Fluoride is the biggest issue especially since it is a constituent of concern for leaching from the waste rock. It suggests that the baseline water quality was not adequately determined."

Discussion: Examining the 1996 EIS, there appears to be adequate discussion and supporting data to address the occurrence of elevated fluoride with respect to baseline water quality. The document states that "The chemical composition of shallow alluvial water samples at the site may be a result of mixing Tertiary volcanic, geothermal, and recharge waters in different proportions. Elevated concentrations of fluoride in samples

from the shallow alluvial monitoring wells in the southern and western portions of the site suggest an influence from geothermal water"; and also "Deeper groundwater in the vicinity of the geothermal wellfield (Table 3-9, GS-1, 2, 5 and J-2) had elevated fluoride and arsenic concentrations as well as elevated pH and temperature values. Samples from shallow alluvial and deeper geothermal waters in this area of the project site all had fluoride concentrations exceeding the Federal secondary maximum contaminant level of 2.0 milligrams per liter and ranged as high as 27.5 mg/l". (Round Mountain Mine EIS, February 1996)

5.4.2 Summary

The Round Mountain case study provides an example of how the Kuipers Maest Report has failed to properly analyze the hydrology, and has therefore misrepresented the monitoring data. Per the 1996 EIS and supporting studies, the baseline concentrations and source of fluoride in the groundwater system (in the vicinity of the Round Mountain Mine area) have been adequately documented. The Kuipers Maest Report has omitted this documentation and has therefore misrepresented the site conditions and impacts. On-going monitoring at the site supports a high fluoride concentration anomaly in the area of the documented geothermal resource area, which remains within the mine POO boundary. The elevated fluoride concentration associated with the geothermal resource will remain within the capture zone of the post closure pit lake, which will constitute a permanent hydrogeologic sink.

5.5 Flambeau

The Kennecott Flambeau Mine is located in Rusk County in northwestern Wisconsin. The mine encompassed 181 acres, with the pit covering about 35 acres. During its 4+ year mine life (1993 to 1997), the mine produced 181,000 tons of copper, 334 ounces of gold and 3.3 million ounces of silver. Ore was shipped via rail for processing at a mill in Ontario, Canada. The Kuipers Maest Report, in Section 6.3.25, incorrectly identifies the Flambeau Mine as an open pit lead and zinc mine with flotation processing, operating from 1991 to 1995.

A certificate of completion and bond release was issued in 2007 for 149 acres of the reclaimed site. In association with the City of Ladysmith, four miles of walking trails have been developed on the reclaimed site and 10 miles of equestrian trails have been developed adjacent to the mine site and the Flambeau River. Additionally, at the request of the City of Ladysmith, 32 acres of the mine site were set aside for a business and recreation park. The area has three former mine buildings occupied by tenants and provides a trailhead and parking for the adjacent equestrian trails.

Information from Table 25.1 in the Kuipers Maest Report is compared to information presented in the 2009 Annual Report for the mine. The Annual Report was available online at www.flambeaumine.com.

5.5.1 Exceedences

The Kuipers Maest Report utilized monitoring and compliance data for the period 2000 to 2003 obtained from the 2003 Annual Report, Groundwater and Surface Water Trends. One surface water monitoring location and four groundwater monitoring locations were used. The following exceedences were alleged in the Section 6.3.25 of the report:

- "Four monitoring wells in the backfilled pit showed exceedences of drinking water MCLs or secondary standards for iron (up to 12 mg/l), manganese (up to 37 mg/l), pH (as low as 6.1), sulfate (up to 1,700 mg/l) and total dissolved solids (up to 3,400 mg/l). One in-pit well showed continued increasing or elevated concentrations of iron, sulfate, TDS, and manganese; other wells showed decreasing concentrations. Groundwater elevations were higher in the backfilled pit than they were between the pit and the river, so water potentially flows from the pit to the river. After groundwater elevations returned to pre-mining levels, concentrations of iron, manganese, sulfate and TDS increased and pH decreased. Values for pH before pumping began were quite

variable (5.8 - ~8.3). Concentrations appeared to peak in 2000 and were slowly decreasing for manganese (from a high of over 5,000 µg/l), sulfate (from a high of almost 700 mg/l) and TDS (from a high of ~1,300 mg/l), but are continuing to increase for iron (up to ~6 mg/l). Zinc concentrations were variable and still (as of 2003) ~700 µg/l (Lehrke, 2004)."

Discussion: Increases in some parameters in groundwater in the backfill were predicted as noted. The in-pit wells are not compliance points. The pit is the area of the mine where the system was designed to re-equilibrate and was not required to have parameters below groundwater drinking water standards. Therefore, the pit water referred to by the Kuipers Maest Report is actually in compliance with regulation.

- "Although concentrations in surface water up and downgradient of the mine showed no temporal water quality trends, a report from the Great Lakes Indian Fish and Wildlife Commission stated that water quality parameters measured have changed from those measured during mine operation, and that the change makes it impossible to compare during- and post-mining water quality (Coleman, 2004). In addition, the report states that the downstream sample site SW-2 is located above the discharge point for surface water coming from the southeast portion of the mine site and therefore may not capture all releases from the mine."

  Discussion: No surface water impacts have been detected in the Flambeau River. Historical data from the 2009 Annual Report show the mine has measured field pH, conductivity, copper, hardness, and zinc from 1991 onward. Iron, manganese and sulfate were added to the constituent list in November 1999. Trend analyses show declining levels of copper and zinc.

5.5.2 Summary

In summary, for the Flambeau Mine:

- The Kuipers Maest Report does not state that in-pit wells are not compliance points and infers that the elevated constituent values represent compliance excedances,

- Surface water data indicate the Flambeau River is not impacted by mine activities.

6 CONCLUSIONS

The key conclusions from this review of the Kuipers Maest Report are as follows:

- The findings of the report are not relevant to any current mines that are being permitted, or to any future mines. Current characterization and analysis techniques have changed so radically from virtually all of the studies cited by the Kuipers Maest Report that it is meaningless to draw any comparison to current predictive evaluation protocols or permitting requirements and conditions.

- The conclusions regarding water quality exceedences cannot be validated. There are virtually no data presented by the Kuipers Maest Report that support the report conclusions. Where data are available, the cited exceedences are often for internal and trigger monitoring points rather than for compliance points that affect the surrounding environment and receptors.

- The data set used in the Kuipers Maest Report includes historical sites, which were put into production before any regulatory constraints even existed. The report also includes a preponderance of mine sites that were studied and permitted during the transition period from un-regulated activity to current regulation, before predictive protocols existed. The study draws conclusions based upon technical work that is old, and may no longer be technically supportable or valid. There is an under-representation of modern mine sites, which have been studied, operated and regulated using modern-day methods.

- The four case studies examined by the current review have highlighted that the Kuipers Maest Report has serious problems in the way that data are represented and interpreted, and in the way conclusions are drawn. The report merely extracts data without trying to understand the conceptual model of the mine site in question, the hydrogeological and geochemical processes involved, or the site-specific nature and layout of the site. Consequently, much of the data interpretation is out of context, so it is not surprising that the resulting conclusions are misleading.

- The Kuipers Maest Report neglects to discuss that increasing data collection and improved models and predictive methodologies contribute to refinements in predictions and site conceptual models. This despite the authors acknowledging the same in their 2005 report on state-of-the-art of predictive methods wherein they include the quote: *"The site conceptual model must be representative of the most important processes and reactions that will occur over time on the mine site, and it can change with time at the mine site and as more information is collected" (Bredehoeft, 2005).*

- The Kuipers Maest Report has defined "impacts" differently from most regulatory bodies with which the mining industry has to comply. The report defines an exceedence of surface or

groundwater quality as any parameter above a primary or secondary surface or groundwater drinking water standard regardless of whether it is in compliance with permit conditions.

- The Kuipers Maest Report argues that many of the exceedences are due to "characterization failures". However, virtually all of the EISs for study mines cited in the report were prepared prior to the BLM guidance for water resource and rock characterization and analysis. Within the context of current analytical techniques, the conclusion has no validity.

- The Kuipers Maest Report includes very little consideration of ambient hydrogeological conditions that were present prior to the development of the mining operation, and particularly cases where modern-day mining has cleaned up older mining operations.

- It is not possible to re-create the summary statistics cited in the Kuipers Maest Report using the information provided for case study mine sites. Scoring systems used in the document have unrealistically low criteria to define the severity of potential impacts.

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Appendix A

Review of Golden Sunlight and Flambeau Mines

Information Presented in Appendix B of the Kuipers Maest Report

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
1981 EIS						
Groundwater and Surface Water	Tailings	Geochemical tests indicate ARD potential but site indications used to suggest low actual potential Potential for contamination of groundwater from tailings solution containing cyanide	Facility design to prevent ground-water and surface water impacts: ○ use of finger drains ○ clay liner ○ cutoff trench ○ impervious nature of the underlying sediments	Risk to groundwater "slight"	None listed	An additional mitigation listed in the EIS was the construction of downstream monitoring wells. Monitoring wells were required even though monitoring systems were optional at that time unless pollutants were "likely to reach surface waters or present a substantial risk to public health" – ARM 16.20.633 (4). The EIS noted groundwater impacts were viewed as possible due to "a drainage system failure or irregularities in the underlying soil materials…" Because of its chemistry, cyanide was not viewed as a significant problem, although the EIS noted heavy metals were a "potentially greater concern." Data through time have indicated continual declines in downgradient constituents. No parameters are above designated levels at the mixing zone boundary.
	Waste Rock	Same as above	No mitigations identified as needed	Risk from ARD "minimal"	WQ Monitoring: No actual impacts noted to date although springs near East waste rock dump and pore water in all waste rock dumps indicated long-term ARD and metals leaching impacts	In 1981, the agencies generally viewed oxidized rock as non-acid generating. Widespread guidance for prediction of ARD using static and kinetic testing was not available until the late-1980s. Subsequent evaluations utilized relevant guidance and it was determined waste rock had a high acid generating potential. There was an analysis for the 1981 EIS that indicated acid generating potential, but observational data suggested ARD

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
						would not be an issue. No seepage from the waste rock dump complexes is evident today, although it is anticipated based on analyses in subsequent EISs. While baseline data are limited, a 1980 water sample was collected from a spring located north of the proposed impoundment (now known as Tailings Impoundment No. 1). The pH was 5.48 with TDS of 533 mg/l and a sulfate concentration of 315 mg/l. Pre-historic ferricrete formation at the site indicates a long history of acidic water from the strongly mineralized area. The spring(s) referenced are not defined, but acidic seeps were present before placement of the East Waste Rock Dump. The Midas seep is described in detail in the 1997 Draft EIS.
Groundwater, Surface Water and Pit Water	Open Pit	Pit not expected to go below groundwater level	No mitigations identified as needed	No impacts to water quality	WQ Monitoring: Monitoring of pit water indicates ARD characteristics	The pit analyzed in the 1981 EIS did not extend below the natural groundwater table and there was no pit water. Pit water was analyzed in subsequent environmental assessments when the pit would extend below the natural water table. The ARD characteristics of the pit walls and pit water resulted in plans to capture all pit discharge for treatment.
1990 EA						
Groundwater and Surface Water	Tailings	Potential for ARD and metals in leachate	Capture of contaminated groundwater	Prevent contamination from becoming	Contamination of cyanide and copper in	The accidental release from TI#1 is discussed under the 1981 "Tailings" section. Tailings Impoundment No. 2

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
			○ Slurry walls and down-gradient wells	more extensive in groundwater and protect surface water	downgradient wells	was designed with a liner and a variety of collection basins. High copper and cyanide concentrations were identified downgradient from the initial pumpback wells. Two additional rows of pumpback wells were installed and the area is maintained as a sink. Pumpback wells east of the impoundment were also installed. Captured water is routed to Tailings Impoundment No. 2. No levels of total cyanide or dissolved copper exceeding standards have been identified at the mixing zone boundary. Commitment to treat mine discharges in perpetuity.
	Waste Rock	Significant potential for ARD and metals in waste rock leachate	Capture of contaminated groundwater ○ Slurry walls and down-gradient wells Engineered covers to reduce leachate production	Mitigation to prevent significant long-term impacts from acid drainage.	No actual impacts noted to date although springs near east waste rock dump and pore water in all waste dumps indicate long-term ARD and metals leaching impacts.	See discussion below for 1998 EIS "Waste Rock." Waste rock is expected to produce acid. Commitment to treat mine discharges in perpetuity.
Groundwater, Surface Water and Pit Water	Open Pit	Significant potential for ARD and metals in leachate from open pit	Capture of contaminated pit water	Mitigations to prevent significant long-term impacts from ARD	WQ Monitoring: Monitoring of pit water indicates ARD characteristics	Pit water captured and routed to water treatment plant and impoundment. Commitment to treat mine discharges in perpetuity.
1998 EIS						
Groundwater and Surface Water	Tailings	Short-term tailings leak	Capture of contaminated	Little or no long-term impact to	Continued contamination of	The accidental release from TI#1 is discussed under the 1981 "Tailings"

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
		containing cyanide and other contaminants expected to continue	groundwater ○ Slurry walls and down-gradient well ○ Landowner buyouts ○ Replacement water provided	groundwater from ARD	cyanide and copper in downgradient wells Capture not 100% efficient due to operational problems	section. Tailings Impoundment No. 2 was designed with a liner and a variety of collection basins. The TI#2 east reclaim basin liner leaked in 1995. Monitoring revealed the leak and the basin liner was repaired. No evidence of leakage currently exists. A site-wide mixing zone at the permit boundary has not had any parameter exceedences including total cyanide and copper. Capture was never expected to be 100%. Typically 80% capture efficiency is used in mixing calculations. Some EIS analyses (presented in the appendices) indicated higher capture efficiencies were possible.
	Waste Rock	Significant potential for impacts from ARD and metals over long-term	Capture of contaminated groundwater ○ Slurry walls and down-gradient well ○ Installation of drains and other seepage capture devices Reclamation cover to decrease long-term potential for impacts from	Mitigations to prevent significant long-term impacts from ARD in surface water	WQ Monitoring: No actual impacts noted to date although springs near east waste rock dump and pore water in all waste rock dumps indicated long-term ARD and metals leaching impacts	The spring(s) near the East Dump are not identified. The former Midas Spring occurred in an active slump area now covered by the East Waste Rock Dump. Historically, the spring was intermittent and did not always emerge from the same location, probably due to the changing hydraulic conditions in the slump. The source of this water is still uncertain, but could be the result of discharge from the abandoned Midas Adit, which is now covered by waste rock. The drainage above the slump (to the west) may provide a catchment area for precipitation, which infiltrates into the ground and is directed into the slump, re-emerging as a contact spring. Water from the former Midas Spring is

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
			ARD			intercepted and conveyed by pipeline to the Golden Sunlight Mine mill facility. Flow measurements taken from the discharge line are low (approximately 1-3 gpm).
Groundwater, Surface Water and Pit Water	Open Pit	Pit water expected to be characteristic of ARD	Capture and treatment – no pit lake allowed to form	Mitigations to prevent significant off-site impacts from ARD	WQ Monitoring: Monitoring of pit water indicates ARD characteristics	The ARD characteristics of the pit water have been well documented. Since the pit was developed below the water table, the pit closure plan has required dewatering and treatment.

Responses to Table 25.1 (Appendix B) – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Flambeau Mine, Wisconsin: Pit Leachate and Groundwater						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
1990 EIS						
Pit Backfill Leachate	Pit backfill	Pit backfill will eliminate pit waters	Backfilling to eliminate possibility of a pit lake. Liming of backfill.	Pit backfill will eliminate pit waters. Predicted leachate concentration in pit backfill was 0.014 mg/l copper, 0.32 mg/l iron, 0.725 mg/l manganese, and 1,360 mg/l sulfate	Four monitoring wells in the backfilled pit show exceedences of drinking water standards for Fe, Mn, pH SO_4, and TDS. One in-pit well shows continued increasing or elevated concentrations of Fe, SO_4, TDS, and Mn; other wells show decreasing concentrations.	Increases in some parameters in groundwater in the backfill were predicted as noted. The pit is the area of the mine where the system was designed to re-equilibrate and was not required to have parameters below groundwater drinking water standards. Annual Reports from 2005 to 2009 are available from www.flambeaumine.com. The 2009 Annual Report (Section 4.1.1) notes "SRK Consulting performed annual assessments reviewing results from the 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2009 monitoring of pore water quality. The monitoring results and assessments confirm the findings presented in the year 2000 monitoring results assessment. An annual assessment was again performed by SRK Consulting reviewing the results from the 2009 monitoring of pore water quality. The February 2010 memorandum, Flambeau Project – Backfilled Pit 2009 Monitoring Results is found in Appendix A. The results from the 2009 monitoring period generally are in agreement with the results from previous years and support the conclusions previously identified. In general, the results indicate that the objectives of the lime amendment program had been met and that any acidity that had been present in the waste rock has been neutralized. The results further indicate that concentrations of major ions in the pore water are stable. For most of the backfill porewater, sulfate concentrations are controlled by gypsum dissolution/precipitation. However, isolated zones are developing where backfill gypsum equilibrium conditions do not exist (e.g. around well MW-1014C). The results provide ample evidence that the porewater in these areas is being displaced by inflowing groundwater. For example, concentrations of sulfate and other solutes are decreasing around Well MW-1014C, without any evidence that precipitation reactions are causing the decrease.

Responses to Table 25.1 (Appendix B) – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Flambeau Mine, Wisconsin: Pit Leachate and Groundwater						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
						This 2009 Annual Report also includes a map of monitoring locations, trend analyses, and statistics.
Groundwater	Pit backfill	Waste rock from the mining operation would have the potential to leach contaminants to groundwater.	High sulfur waste stockpiles and ore crushing/loading areas lined. Treatment of mine water before discharge; Liming of backfill. Settling ponds to collect runoff from low sulfur stockpiles	Slightly increased TDS, hardness, SO_4, Fe, Mn may be expected from leachate infiltration. No impacts from high sulfur stockpile, ore crushing areas. Worst-case leakage would leak into mine pit where water would be treated before discharge. Groundwater under ponds flows to pit, limiting contamination .	Samples taken from a well between the river and the pit show exceedences of drinking water standards for Fe (2.8-7.4 mg/), Mn (3.1-4.2 mg/l), pH (5.9-6.2), SO_4 (250-460 mg/l), and TDS (810-1,100 mg/l)	Section 4.1.1 of the 2009 Annual Report also states: "As part of the permitting effort for the Flambeau project, assessments were completed to determine if the reclaimed site would comply with the permitted groundwater quality standards at the compliance boundary and protect surface water quality in the Flambeau River. The original assessment relied on predicted post-mining hydrologic conditions to conclude that the Flambeau River would act as a hydrologic boundary for the pore water migrating from the pit backfill and that backfill pore water would not migrate to the downgradient compliance boundary. In addition, the original analysis showed that the flux of backfill pore water into the river would be so small relative to the flow in the river that surface water quality would not experience a measurable change. Section 2.2 of the 2009 Annual Report summarizes groundwater quality assessments as follows: "Assessments of the backfill groundwater quality have been routinely performed with the most recent being completed in January 2010. The assessments show that the regional groundwater flow, including backfill water, is flowing toward the Flambeau River as was predicted during permitting; stable conditions have been reached at depth within the backfill; manganese concentrations appear to have stabilized or are decreasing over the last three years; any acidity that had been present in the backfill has been neutralized by the limestone; sulfate concentrations in the majority of the backfill are now controlled by gypsum precipitation and dissolution; and concentrations of solutes in the backfill are stable and should not significantly increase in the future and, in fact, many are showing a decreasing trend. Further detail on

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						groundwater quality can be found in Section 4 of this report." Data for all wells are also provided in appendices to the 2009 Annual Report.