Global Benchmarking of Mining Waste Rules – US

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This report provides additional detail to support the completed excel document.

Executive Summary

The spreadsheet review for Montana, Arizona, and the General Mining Act of 1872 (1872 Mining Law) may be summed with one somewhat obvious (if not obtuse) idea: The more subjective the tailings impoundment language is in the law, rules, or regulations, the less likely that tailings impoundments will achieve the most protective interpretation of that language. More discretion can yield more lenient interpretations and laxer implementation of the law.

Both Montana and Arizona laws (plus rules and regulations) include requirements for many if not most items that are included in the Safety First Guidelines (SFG). But discretion in applying even good conceptual laws is one of the next-biggest factors in Montana's and Arizona's requirements not really achieving protections like the SFG. The subjectivity in interpretation and/or application of the states' laws essentially mitigates any guarantee, or even probability, of comparability with the SFG.

This lack of regulatory specificity also points to political and economic pressures, which are almost always pro-development. These political and economic forces therefore are often evident in both the actual laws that are enacted and then how the laws are interpreted and employed.

The 1872 Mining Law is a unique law for many reasons, including that it remains the only significant federal land-disposal statute remaining from the 19th century. An argument can be made that federal regulation of mining is covered by a collection of other federal laws, however, other laws do not fill the regulatory gaps resulting from having only an antiquated federal umbrella law for mining.

Executive Summary Montana

For numerous items, the Excel spreadsheet identifies that Montana does not have a requirement or standard that meets the SFG. Generally, where there is a "No", then it was concluded that Montana does not have a reasonable comparable to the SFG. Where there are nuances regarding the conclusions they are explained in the spreadsheet and in the notes below.

Specific Montana Provisions

1. Ban upstream dams at new mines, and safely close existing upstream facilities

Montana does not have express legal requirements to ban upstream-constructed dams at new mines, and safely close existing upstream-constructed facilities and therefore it was described as "No" in the spreadsheet. However, while Montana does not specify upstream, downstream, or centerline construction in its regulatory rubric for mine tailings impoundments, it does include requirements that, if optimally applied, *could possibly* yield similar regulatory outcomes. "Could possibly" indicates that the regulatory application could be met but it would be discretionary and therefore subjective on the part of the state regulators. The state's mine regulators have the discretion and authority to interpret the law in many ways, allowing for regulatory decisions that could prohibit/require a construction method – or to not choose or prohibit a construction method. That discretion is a major factor in determining that the Montana law for construction methods are not required to select/avoid a construction method. The Notes describe in more detail how these options could possibly yield a regulatory decision at a mine that is consistent with the SFG - but could possibly also fail to meet the SFG's requirements. The three features discussed most likely comparable or non-comparable to the SFG, include,

1. An independent review panel whose experts are chosen by state regulators in such a way that could yield a biased or unbiased panel, rendering the results possibly suspect.
2. A "tailings operation, maintenance, and surveillance manual" that the permit applicant/mine is required to develop for a tailings storage facility. It is more strictly described and is probably subject to less subjectivity than, for example, the technical review panel.
3. Third there are other general and specific regulatory requirements that together as a regulatory scheme could be more or less subjective and therefore more or less effective to actually achieve the guidelines.

A notable exception to this section is for Small Miners, which are defined in Montana by their comparatively small number of acres disturbed. Their mines are not subject to numerous provisions that apply to larger mines, such as an independent review panel. Montana law for small miners would therefore almost certainly fail to achieve comparable requirements in the SFG.

2. Mandate the use of Best Available Technologies, in particular for filtered tailings

An argument could be made that Montana requires the use of Best Available Technologies for tailings impoundments, but the law does not specifically demand and describe what those technologies are. The regulatory discretion to determine those things makes it very difficult to conclude that such discretion could not effectively

negate the requirement's substantive (and objective) meaning. Therefore, it was concluded that Montana's requirements do not meet this SFG requirement.

3. Appropriate monitoring systems must be in place to identify, disclose, and mitigate risks

Annual reviews and the content of the mine's required Tailings Operations Manual could achieve many of the SFG requirements for monitoring in this section. But discretion inherent in the content/approval of the Operations manual and the Annual reviews makes Montana's provisions "maybe" as compared with a simple no or yes. Technically, because the yes is not guaranteed the assessment is "No" the Montana law does not achieve this section's monitoring requirements, but it is one of the better examples where the Montana law could come close to the SFG if regulators strictly applied the laws.

4. Towards safer closure with no credible failure modes

Overall, Montana's requirements in this section are arguably close to the minimum requirements of the SFG, but limitations in actual application caused the review to conclude "Maybe" and "No" to some items. For example, detailed reclamation plans are not required prior to permitting/operations: a generalized reclamation plan is required at the start and detailed plan is required later in the mine's operational life. On the one hand this is reasonable because a detailed plan completed at the start of mine operations is not likely to reflect the evolution of the mine's plans and operations. On the other hand, a detailed plan could be modified as the mine's plans and operations evolve – giving regulators and the public a clear idea of reclamation that is reasonable and probable at any time in the mine's life. Such evolving reclamation details would also allow ongoing detailed evaluation of necessary financial sureties to achieve the evolving project. It is likely that mines would not want to do this because of the ongoing up-front costs but the reclamation plan is important enough to warrant such details through the mine's life.

Such requirements would also be an important safeguard if a company goes out of business or sells to a junior company which result in insufficient funds to properly reclaim the site. Montana law requires periodically evaluating the mine's financial assurance, but that surety is more likely to be more accurate and representative of the actual costs if its calculations were made on a detailed up-to-date reclamation plan.

5. Address financial risks, including proper financial assurance and insurance

Montana's rubric for financial sureties includes a mixture of Yes/No compared to the SFG. On the one hand, Montana requires a detailed and largely transparent evaluation of financial assurance needs and requires it to be reevaluated every few years. On the other hand, the SFG requires notable requirements that Montana does not expressly

require. These include qualitative requirements such as third-party review and accounting standards. But Montana could comply/be complying with such requirements, depending on its regulatory implementation.

Montana does not meet SFG requirements for some things, such as a bankable feasibility study and evaluation of all failure modes. Montana does have requirements that could capture some of these things, but they are more subjective than the SFG's objective requirements.

6. Make information regarding mine safety publicly available in relevant languages

Montana's public access to records comes reasonably close to many SFG requirements. There are some limitations to this, largely based on proprietary information (especially exploration) and the process to request information from the state, which may take time. Because of Montana's large size, if a person wanted to review paper records, it could necessitate driving long distances from a person's home (even at the county-level, Montana is a large state). The state's reliance on the internet for information and data significantly mitigates this obstacle, but not everybody has access to and skill with the internet.

Montana notably does not include requirements for alternative languages to common English. Based on Montana's demographics,[1] this could (not exclusively) impact constituents whose primary languages are Native American or Spanish.

In general, Montana law does not specifically refer to making public the elements in 6c. Some may be captured in the overarching requirements for public disclosure. Those data and information would be available as part of Montana's public availability requirements described above.

7. Climate Change

Montana does not have relevant climate change laws relating to mining and therefore does not have much to compare with the SFG. Montana has some laws that could arguably be related to climate change but none that use climate change as a trigger or goal/requirement.

An exception to this is a lawsuit brought by minors (under age 18) that argued that the Montana State Constitution requires considering climate change.[2] They won their

[1] *See* https://www.census.gov/library/stories/state-by-state/montana.html#race-ethnicity.
[2] The lawsuit was Held v. State of Montana. *See* https://law.justia.com/cases/montana/supreme-court/2024/da-23-0575-0.html. *See e.g.* https://apnews.com/article/climate-change-youth-lawsuit-montana-86b181dc09ede1c6c21bcc0a4e5a2a38 and https://apnews.com/article/youth-climate-change-lawsuit-montana-7c4b6261f610d504995743f7320533e8. The

lawsuit but there have not been any legislative changes as of this writing, and similarly there has been no evidence of any changes in mining regulation based on that litigation. The litigation was in Montana State courts and currently a similar case is pending in the Federal Court for the District of Montana (the courts of the United States that are located in Montana).[3] That case is in the district court level and if the results of that litigation are appealed they would go to the 9th Circuit Court of Appeals and then possibly the United States Supreme Court.

8. Ban new tailings facilities where inhabited areas are in the path of a tailings dam failure

Montana law does not expressly ban new facilities where failure would be above inhabited areas, but the law does consider two particular scenarios where a tailings impoundment failure would result in significant down-flow events. The first is when a dam failure above another dam(s) could result in a chain of failures, with the above failure triggering other dam failures below. The second is that mine permitting must identify residences below and therefore populations below a tailings impoundment. This is not the same as prohibiting impoundments where people live below – it is discretionary, but it does require such considerations even if the regulators could allow such construction above residences. No. 8a. The permit application must identify residences, which would capture populations below the mine's operations. Such safety and timely evacuation *should* thereby inherently be considered, but it is subject to regulatory discretion (and subjective).

Executive Summary Arizona

Arizona entities appear to often identify with prioritizing "5-Cs" to describe the state: copper, climate, cattle, cotton, and citrus (and they are reflected on the Arizona state seal).[4] Similar to Montana's state seal ("oro y plata" which is "gold and silver") it suggests a strong history and affinity with mining. But Arizona's regulatory rubric appears to be even more subjective than Montana's. As discussed above, the more subjective (or less objective) a regulatory requirement, the less likely it is to be consistently and aggressively enforced. Which may in fact be the government's (legislature writing law, regulators implementing law, courts interpreting law) desired outcome. For purposes of this comparison and analysis, the subjectivity of the requirements, whether intentional or unintentional, are considered the same thing.

Montana Supreme Court opinion and summary are available at https://law.justia.com/cases/montana/supreme-court/2024/da-23-0575-0.html, among other places.

[3] *See e.g.* https://dailymontanan.com/2025/09/17/federal-judge-questions-scope-of-possible-remedy-in-climate-change-lawsuit/.

[4] *See e.g.* https://www.azcentral.com/story/news/local/arizona-environment/2025/02/24/what-are-5-c-s-arizona/76799629007/, https://www.usda.gov/about-usda/news/blog/five-cs-arizona,

The top Arizona mine regulator is the State Mine Inspector, which is an elected office and has the final discretion over most mining permits and determinations. There is, of course, a governmental rubric below the State Mine Inspector that does most of the day-to-day regulatory tasks, but the Inspector has the final say in most state mining decisions and therefore has significant authority to make and implement interpretations and determinations throughout the state.

As a result of Arizona's legislative goals and the state's long history of mining, almost every SFG comparison is "No" for Arizona, meaning that Arizona law does not achieve SFG goals for the super-majority of category lines. Those that it does, like requiring a financial assurance (5a-c) are the high-level comparables, such as simply requiring financial assurances. The more detailed (lower level) SFG requirements are generally not met, largely because Arizona does not have related language or because the requirements are highly subjective.

There is comparatively little to actually discuss when comparing the SFG and Arizona's law because, for the most part, Arizona does not have equivalent requirements as the SFG. Most overlap is because Arizona law provides a very broad set of goals and affords regulators great discretion. This high degree of regulatory discretion/subjectivity makes Arizona's laws incomparable/inequivalent to the SFG. That is not because Arizona does not consider some of the elements in common with the SFG, it is because Arizona does not mandate equivalent regulatory outcomes for each.

Executive Summary 1872 Mining Law

To some, the fact that the General Mining Act of 1872 (1872 Mining Law) is still valid law demonstrates how inferior the federal government's regulation of mining really is. The Law's provisions are more about exploring and claiming mineral resources on US federal lands than on actual mining or reclamation methods.[5] While that suggests a clear deficiency in the law, there are other US federal provisions, such as the Clean Air Act, Clean Water Act, Endangered Species Act, the National Environmental Policy Act (NEPA), and others that may apply to a mine on federal lands, possibly filling gaps in some of the deficiencies in the well-aged law.

Even so, the fact that the 150-year old law remains suggests that it has not kept up with advancements in every element relevant to mining, from environmental and cultural sciences to mining methods and reclamation technologies. The Law was really meant to promote westward expansion and wealth and therefore was significantly a land

[5] *See generally*, https://www.congress.gov/crs-product/R48166. The government site illuminates the law relative to a significant mining legal case about an Arizona mine.

disposal law, like many of the land-grant laws of its era, to claim minerals on federal land and transfer of those lands/wealth to the private sector.[6]

As it relates to tailings impoundments, the 1872 Mining Law is even more inequivalent to the SFG than Arizona's laws are. There is not a lot to describe or discuss in the comparison column between the SFG and the 1872 Mining Law because the 1872 Mining Law simply does not consider these requirements.

Notes for I. Montana, II. Arizona, and III. the 1872 Mining Law

I. Montana

Note that Montana Statutes, which come from the Montana Legislature and are signed by the state's Governor, are organized as the Montana Code Annotated (MCA) and its regulations, which derive through administrative procedures, are organized as the Administrative Rules of Montana (ARM).

1e. Montana does not discuss specific construction methods (e.g. upstream, downstream, centerline) in its statutes or regulations. However, Montana does have tailings impoundment requirements that could reasonably, or should reasonably, capture many important features in Safety First and/or the Mount Polley Investigation's BATs. Montana's requirements are *not* specific *substantive* or end-result requirements but instead are *procedures* that must be followed as a part of tailings impoundment design and permitting processes. Their results will depend significantly on their implementation. Like many regulatory frameworks, this is not unlike the US' National Environmental Policy Act (NEPA) which has been interpreted by courts as requiring procedural, and not substantive, outcomes.[7]

Montana law considers best practices through permitting and its Tailings Review Panel, but these are not equivalent to those for Mount Polley BATs. Montana's could be argued to capture the spirit of the Mount Polley BATs, but specific BATs are not described in detail and the processes employed in Montana are subject to regulators' interpretation and application, which may be subjective. Montana's requirements may be grouped into

[6] *See e.g.* https://www.congress.gov/crs-product/R48166 and https://meic.org/the-1872-general-mining-act-is-slated-to-turn-150/. Today, the 1872 Mining Law contrasts with the Federal Policy Management Act (FLPMA) which in 1976 directed federal government policy to retain and manage federal lands in the public interest (many current political debates and actions seek to continue disposing federal lands to private interests, but that is beyond the scope of this analysis). Where the 1872 Mining Law allows individuals to stake claims on federal lands without prior authorization, covers minerals, and does not consider environmental or social impacts, the Federal Land Policy Management Act established a rubric for land use planning and resource management requiring management of federal lands for multiple uses (resource extraction but also recreation and conservation). *See* https://www.congress.gov/crs-product/R48166 and *see generally* https://www.law.cornell.edu/wex/mining_claim,

[7] *See e.g.* https://natlawreview.com/article/course-correction-supreme-court-steers-toward-greater-predictability-nepa-reviews.

three general headings that collectively include substantial regulatory components for tailings impoundments.

a. First is an "independent review panel" that the permit applicant/mine must convene to review and consider a proposed tailings impoundment. *See* MCA 82-4-377, 380.
    i. Montana requires implementation of an Independent Review Panel, which goal is to ensure that appropriate experts certify in writing that the impoundment design will operate as designed (not fail, cause contamination, etc.). Specifically, the panel must review the design document, underlying analysis, and assumptions for consistency to assess the practicable application of current technology in the proposed design. The panel must consist of a majority of licensed engineers and members must be approved by the state regulators -- and cannot include employees of the operator, permit applicant, or the design consultant, the engineer of record, or the constructor. The Panel must prepare a written report that may include recommended modifications to the design and be signed by each panel member. *See* MCA 82-4-377.
    ii. Periodic Inspection by a review panel, similar to the one that approved the design, is commenced at construction and thereafter at least every five years. *See* MCA 82-4-380.
b. Second is a "tailings operation, maintenance, and surveillance manual" that the permit applicant/mine is required to develop for a tailings storage facility. *See* MCA 82-4-379.
    i. Another notable element is that Montana requires the mine to develop a tailings operation, maintenance, and surveillance manual. The manual must contain, for example, details for impoundment operations, personnel, maintenance, inspection, quantitative performance parameters, emergency response, etc. The engineer of record must certify by seal that the manual is consistent with the facility's design, is reasonably sufficient to ensure that the tailings impoundment will perform as intended and detect deviations if they occur, and the emergency plans are reasonable to protect human health and the environment. The operator must then review the manual annually to ensure that the manual reflects the mine's current conditions. Any revision of the manual during operation or at closure must be re-certified by the seal of the engineer of record. *See* MCA 82-4-379.
c. Third are general and specific statutory elements which seek to ensure that a permit application yields a safe impoundment structure. But they are discretionary; that is, subject to regulators' subjective application. Montana's statutory requirements for tailings storage facilities design documents include detailed and fairly predictable requirements for content and documentation. *See* MCA 82-4-376.

In sum, these regulatory provisions may yield tailings impoundments that meet Mount Polley BMPs. However, actual implementation remains subjective because, even with a licensed engineer's stamp of approval, individual provisions may not achieve those BMPs. Court cases involving challenges to the mine plan and/or operating permit have concluded that if the statutory steps are procedurally implemented, then they have met the regulatory requirements. In function, this underscores that these statutory requirements are significantly procedural and do not require substantive outcomes.

Small Miners
It is worth noting that Montana has a special regulatory rubric for small miners, which are defined as mining operations with less than 5-acre disturbance. Small miners are subject to a substantially reduced regulatory – and technical – review and permitting process. Regarding small miners' tailings impoundments, MCA 82-4-305 (8)(a) provides that (except for placer or dredge mines) small miners that will impound ore processing wastes must get the state's regulatory approval for the design, construction, operation, and reclamation, plus a bond. This can be substantially less than what is required for larger mines and does not require, for example, an independent review panel, detailed tailings operational manual, etc.

2i. *See* MCA 82-4-336(9)(c) which provides that the use of tailings-backfilling as a reclamation measure is neither required nor prohibited in all cases. A regulatory decision to require any backfill measure will be made based on whether and to what extent regulators conclude the backfilling is appropriate under the site-specific circumstances and conditions in order to achieve applicable standards.

4f. The Montana State Legislature's stated intent was that "the regulation of tailings storage facilities is not prescriptive in detail but allows for adaptive management using evolving best engineering practices based on the recommendations of qualified, experienced engineers." See 82-301-2-1(2)(c). This intent is a clear demonstration of its higher-level goals that in practice/implementation are subject to the subjective interpretation of regulators. It is not unreasonable to say that two "qualified, experienced engineers" could have vastly different "recommendations" about a particular issue or option, rendering "adaptive management using evolving best engineering practices" to yield divergent outcomes. While "prescriptive" detail and requirements can appear stifling, the more regulatory discretion allowed, the more the outcomes may diverge from the "stated intent."

5d. Financial Assurance Form
Montana has detailed language about calculating financial sureties (locally often called "bonds" or "performance bonds"). It leaves many other details, including the form of the surety, up to agency discretion. *See* MCA 82-4-338 and ARM 17.24.143 and 144.

As a result, the Montana statutory requirements are not effectively comparable to the SFG. However, if the Montana statutory requirements could be interpreted and applied in a way(s) that achieves the same outcome as the SFG. It simply is not mandated.

5e. Financial Assurance Review

Montana does not describe/require specific accounting methods/procedures, such as "accepted accounting methods." It requires that the state conduct an overview of the amount of each bond annually and conduct a comprehensive bond review at least every 5 years. The overview is a generalized evaluation of whether there have been changes at the site or to the permit that warrant reviewing bond calculations. The 5-year review is a more comprehensive and detailed consideration of the bond's calculation/amount. The state requires bond recalculation in response to substantial change to the mine permit or mine's operations. *See* MCA 82-4-338.

6. Public Availability of Information

Most mining information in the state's files, which would include applications, permits, inspections, investigations, monitoring, etc., are available to the public. An exception is that exploration applications and records are considered confidential, subject to limited exceptions. *See* MCA 82-4-306 and 307. There are also various events that require the State to publish public notices (usually in a relevant newspaper(s) and on the State's website), such as for the start of review of a mine operating permit and financial surety review/release. *See e.g*. MCA 82-4-338 and 353. Montana does not have requirements to make information available in appropriate language(s).

II. Arizona

Note that Arizona Statutes, which come from the Arizona Legislature and are signed by the state's Governor, are organized as the Arizona Revised Statutes (A.R.S.) and its regulations, which derive through administrative procedures, are organized as the Arizona Administrative Code (A.A.C.).

2a. Arizona does not require best practices for tailings impoundment designs, but it does include best practices as an element for regulators' permitting considerations. However, these are general in nature and subject to regulators' subjectivity. Arizona statute provides that:

> 1. That the facility will be so designed, constructed and operated as to ensure the greatest degree of discharge reduction achievable through application of the best available demonstrated control technology, processes, operating methods or other alternatives, including, where practicable, a technology permitting no discharge of pollutants. In determining best available demonstrated control technology, processes, operating methods or other alternatives, the director shall take into account any treatment process contributing to the discharge, site specific hydrologic and geologic characteristics and other environmental factors, the opportunity for water conservation or augmentation and economic impacts of the use of alternative technologies, processes or operating methods on an industry-wide basis. A discharge reduction to an aquifer achievable solely by means of site specific characteristics does not, in itself, constitute compliance with this paragraph. The requirements of this paragraph for wetlands designed and constructed to treat municipal and domestic wastewater for underground storage pursuant to § 49-241, subsection B may be met by including seepage through the bottom of the facility if it is demonstrated that site characteristics can act to achieve performance levels established as the best available demonstrated control technology by the director. In addition, the director shall consider the following factors for existing facilities.

A.R.S. 49-243(B)(1).

Regulations for certain water quality permits similarly require best practices as one of numerous regulator considerations, but these are not specific to tailings impoundments and may not even be considered in all situations. Further, these are not equivalent to the SFG's requirements for best practices, which are specified and much more objective.

5c. To transfer an approved reclamation plan, Arizona statute provides that:

> A. A reclamation plan may be transferred from one person to another, by operation of law or otherwise, if the current owner or operator notifies the state mine inspector in writing before the transfer. The notice shall include:
> 1. The name, address, telephone number and statutory agent of the person to whom the plan will be transferred.
> 2. The effective date of the proposed transfer.
> 3. A proposed financial assurance mechanism.
> 4. Other information the inspector may determine to be necessary by rule.
> B. The inspector may deny a transfer on determining that the proposed financial assurance mechanism does not comply with article 5 of this chapter or that the transferee is not capable of operating in compliance with this article, the rules adopted pursuant to this article or the conditions established in the plan. The inspector shall issue notice of and the reasons

for the denial within fifteen days after receiving the proposed transfer. Except as provided in section 41-1092.08, subsection H, a final administrative denial of the plan transfer is subject to judicial review pursuant to title 12, chapter 7, article 6.

ARS 27-928.

5h. *See e.g.* A.R.S. 27-273 and following sections. Many details in the bonding statute are discretionary and therefore subject to regulatory subjectivity.

III. 1872 Mining Law

To some, the fact that the General Mining Act of 1872 (1872 Mining Law) is still valid law in 2025 may demonstrate how inferior the federal government's regulation of mining really is. Its provisions are more about exploring for and claiming mineral resources on US federal lands than on actual mining or reclamation methods.[8] While that suggests a clear deficiency in the law, there are other US federal provisions, such as the Clean Air Act, Clean Water Act, Endangered Species Act, National Environmental Policy Act, and others that may apply to a mine on federal lands, possibly making up some of the deficiencies in the well-aged law.

Even so, the fact that the 150-year old law remains suggests that it has not kept up with advancements relevant to mining, from environmental and cultural sciences to mining technologies and reclamation methods. The law is not heavily/commonly cited or applied in mine permitting or operations, or in the litigation over those topics. It comes from an era that could not have qualitatively or quantitatively anticipated current mines. To help illustrate this concept, in 1872, patents[9] were issued for the manufacture of the wooden toothpick, the pipe and valve fire extinguisher system, dried milk, and the metal windmill.[10] It was written before x-ray spectrophotometry, ground penetrating radar, chemical detection limits in the parts per billion (or even the discovery or understanding of many chemical constituents and contaminants), and many if not most of the geologic and chemical advances that make current mining possible.

The sum of these considerations is that the 1872 Mining Law is not even close to equivalent to the SFG. There is not a lot to describe or discuss about the comparison column between the SFG and the 1872 Mining Law because the 1872 Mining Law simply does not contain equivalent requirements.

Further, the 1872 Mining Law was written before many if not most methods necessary for today's mining were invented/discovered. This is particularly true for reclamation.[11] Elements in the GFS have no clear comparable provisions in the 1872 mining law.

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[8] *See generally*, https://www.congress.gov/crs-product/R48166. The government site illuminates the law relative to a significant mining legal case about an Arizona mine.

[9] These are noted to help appreciate the historical time when the Law was passed. These patents are not the same as a mining law patent, which is a deed transferring federal ownership of land to a private entity. *See* https://www.law.cornell.edu/wex/mining_claim.

[10] *See* https://www.onthisday.com/events/date/1872.

[11] Methods for mining/ore extraction seem to have advanced faster and more broadly than methods for reclamation and closure.