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To:	DEP, MiningComments2016
Cc:	Mercer, Paul; Livesay, Nicholas; Marvinney, Robert G.; Attorney General; Sauer, Mary; Bertocci, Cynthia S
Subject:	Risk Of Catastrophic Failure Case Study of Maines Mining Statute & It"s Draft Chapter 200 Implementing Rules
Date:	Monday, September 26, 2016 4:45:26 PM
Attachments:	Failure Prevention Risk Assessment .pdf

September 26, 2016
RE: Draft Chapter 200 Rules

Dear Members of the Board of Environmental Protection

I attach a framework for evaluating statute and regulation against 5 forensically determined known root causes of catastrophic mine failure. These five root causes are widely recognized within the mining industry and among global leaders in responsible mining. Maine's statute scored 42 out of a worst case score of 50; the draft rule Before you 43 out of a worst case score of 50, both categorized as "High Risk"

Within existing statute it is possible, though to adopt provisions which could lower Maine's overall combined score to 58 moderate risk from its present high risk combined score of 85. That difference between 58 nd 85 is the space within which the seeds of catastrophic failure can germinate, grow and manifest in catastrophic non remediable failure.

I urge you to stop the clock on the resent rule review, focus on emergency adoption of provisions addressing thee 5 root causes of failure, as outlined in the attached and demand that the statute be fixed under expert guidance of a multi disicplinary expert panel free of all political, agency and mining lobby influences

Thank you for your deliberations...

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RISK OF FAILURE ASSESSMENT OF MAINE MINING STATUTE AND DRAFT IMPLEMENTING RULES: A Case Study Evaluating Mining Statutes & Rules

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SUMMARY

A "Risk of Catastrophic Failure Analysis" of Maine's Mining Statute (PL 2011 c.653) and its now under review draft implementing Chapter 200 rule concludes that Maine's statute itself is a potential root cause of such failure. This has been the case in many of history's most dramatic and costly failures including Mt. Polley and Samarco, both modern mines and both among history's top 10 in terms of consequence and scale of failure. Maine's statute scored 42 out of a maximum "worst case" score of 50 and is classified as "High Risk", against 5 key criteria commonly found to be root causes of catastrophic failure.

Although the Maine statute is poorly framed and poorly informed it nevertheless contained a few very common mandates including demonstrated "technical and financial capacity of the applicant", a requirement for the use of proven technology and a requirement to return the site to its pre mining condition. Aside from these provisions, from which meaningful catastrophic loss prevention provisions could be developed, there are extensive gaps in policy and mandate. This is also true of many U.S., Canada and foreign statutes in major metals producing areas.

We found, nevertheless, that without any changes at all in Maine's statute, it would be possible to amend the existing rules with provisions which would be effective in reducing risk of catastrophic failure. A score of 16 out of a possible best case score of 5 can be attained within the existing statute despite its many flaws, gaps, internal inconsistencies and contradictions through wiser better informed rule provisions addressing main root causes of catastrophic failure.

The statute's implementing rule, drafted by the Department of Environmental[LNB1] Protection (DEP) and accepted for review by Maine's unique Citizen Panel (Board of Environmental Protection,(BEP)), scored lower than the statute itself at 43 out of a worst case of score of 50 because it constructively nullified the key mandates of the statute in which failure prevention updates could be anchored by not developing these provisions or avoiding them completely. Its low score was otherwise attributable to (1)

[The] difference between the best possible outcome score of 16 and the score of 44 for the rule ….. is a void in which the seeds of catastrophic failure can germinate, incubate and mature to a manmade catastrophic failure

dropping better and more professional language in the 1991 draft rule that is not in any conflict with statute and (2) not including any useable language that would be effective in preventing or reducing the risk of catastrophic non remediable failure and extensive non remediable consequence.

That difference between the best possible outcome score of 16 and the score of 43 for the rule DEP has delivered to the public and Maine's BEP, is a void in which the seeds of catastrophic failure can germinate, incubate and mature to a manmade catastrophic failure. Of the 33 million tons of metallically mineralized rock at the state's largest known deposit, Bald Mountain, 22 million tones will become toxic high arsenic tailings with high ARD potential or be leached to chemical suspensions in large feeder dams to SW/EX (electrowinning) facilities. So there is clearly a potential for a man made catastrophic failure at the 33 acre Bald Mountain site, should any mining at all ever become economically viable. Maine's statute and draft rule further elevate the risk of that by providing no meaningful checks against known root causes of catastrophic failure.

Of the 33 million tons of metallically mineralized rock at the state's largest known deposit, Bald Mountain, 22 million tons will become toxic high arsenic tailings or be leached to suspensions of chemicals sitting in large feeder dams to SW/EX facilities. So there is clearly a potential for a man made catastrophic failure at the 33 acre Bald Mountain site, should any mining at all ever become economically viable. Maine's statute and draft rule further elevate the risk of that by providing no meaningful checks against known root causes of catastrophic failure.

Most modern advances in metallic mining oversight occur through rule and not statute, the most dramatic example being West Australia who wrote exemplary rules against a statute essentially comparable to BLM at the turn of the century.(We have not rated those rules on effectiveness in preventing catastrophic failure and we know from past review it has some serious gaps). Most modern U.S. and Canadian mining rules evolved in response to enacted environmental law with a view to mining compliance so most statutes have sufficient mandate through environmental law to effect the "Catastrophic Failure Prevention Provisions" through rule with no statutory changes.

In the case study statute (Maine pl 2011 C.653) that mandate is fragmented by several mining specific changes to environmental law including allowing on site groundwater contamination. However, as discussed further below, other mandates which are clear and compensating provide "anchors" for catastrophic failure provisions.

A failure at a TSF with a capacity in excess of 2 million cubic meters or a feeder dam failure if processing of ores by leaching, would travel many kilometers not thousands of feet and result in non- remediable loss of downstream lands ponds, streams and brooks and all terrestrial and marine habitat. As forensic examination of older tailings failures evidence, tailings can never become soils capable of supporting and sustaining any kind of plant life long term. At Los Frailes the path of the 1998 tailings flow remains barren and subject to erosion after all known technology has been applied to removal and remediation of land deposited tailings. At a previously undocumented 1937 failure in Mexico to this day no sustained growth has occurred on the lands despoiled by the tailings flow 80 years ago.

1.0 INTRODUCTION

All catastrophic mine failures in history are failed private public partnerships and virtually all are man-made. Inadequate legal frameworks and/or inadequate enforcement is an increasingly cited "first cause" of such

catastrophes.(including Mt Polley Expert Panel 2015, Blight , Geoffrey 2010) Imperial Metals, for example, was found to be not in violation of any permit terms and conditions even though the expert panel found a long term pattern of deviation from best practice and best knowledge that ultimately culminated in one of the 10 worst failures in mining history. BC rules even facilitated failure by allowing double duty use of the TSF as mine water storage during operations, a practice the Mt Polley Dam Committee says should not be allowed (Mt Polley Expert Panel 2015)

Most very serious TSF failures occur at operating mines not at closed or legacy mines as the mining industry has maintained to lawmakers, the general public, and to/about the immediately affected area around the mine site. Post 1990 there is a marked increase in the trend to high severity high consequence mine failures 55.9% of all very serious failures since 1940 occurred since 1990, well after environmental law was in place. Over the 80 years 1936-2015 the expected rate of very serious failures is 5 per decade (40/8). In the last three decades the rate has been 8.0 (24/3), a 60% elevation above the 100-year average. These data as of 12/31/2015 trend to an expected count of 10 for the decade 2010-2020., twice as high as the long term rate 1936 to 2015. (Bowker Chambers 2016) Again this is contrary to the assertion of the mining industry that these failures arise from circumstances allowed to form prior to enactment of environmental law.

These failures occur at modern mines using modern and widely practiced technology. The failed Fundao dam in Brazil which resulted in the worst catastrophe in mining history was designed and put on line in 2009 and was co- owned by two of the world's largest miners, BHP and Vale.

Looking forensically at the history of man-made catastrophic failures there are five identified root causes of these failures, all preventable if sound legal frameworks and effective enforcement existed.(Bowker Chambers 2016)

(1) Improper/incompetent assessment of the economic feasibility of developing the deposit or undertaking the planned expansion of extraction areas viz global trends and emerging major market changes.

(2) Lack of technical, geophysical and mining economics expertise in making the assessment in (1) above and in correctly assessing efficacy of mine development and waste management technology life of mine and prior to approval of a mine development or mine expansion.

(3) Impaired financial capacity and/or inability to attract adequate capital through quality capital markets and regulated exchanges

(4) Inadequate command of, and adherence to, best knowledge, best practice, best proven technology in similar deposits in similar climates

(5) Failure/Inability to recognize and act on unplanned or changing conditions that elevate risk of catastrophic failure

2.0 ASSESSMENT PROCESS

This analysis looks first to statute and then to rules to see whether these root causes of failures are (a) specifically recognized and (b) specifically addressed and (c) stated conditions of approval and of maintaining the permit in active status. Statute is then reviewed again to see if any specific barriers exist to recognizing and addressing these key root causes of catastrophic failure as conditions of approval or as conditions of permit active status.

We chose Maine as a case study because globally it is one of very few modern efforts to form a de novo policy on metallic mining for an area with a very limited mining history, i.e. little own experience to draw on, absence of long term mining stakeholder interests involving considerable investments and obligations to investors. In other words Maine has a higher potential to achieve a modern mining legal framework to which other mining jurisdictions world-wide could aspire whether or not any mining in Maine ever becomes economically feasible.

Maine is further an excellent case study and touchstone because it has one of the most challenging high risk geochemical and geologic profiles so the consequences of failure, the gravity of damage to human health and the environment in the event of a catastrophic failure would be more extreme than has been experienced at most other catastrophic mine failures in history. (Chambers 2014)The absence of provisions addressed workably and knowledgeably to catastrophic loss prevention under such elevated “inherent risks” is a worst case condition. Further, choosing for case study such an extreme high “inherent risk” State affords an opportunity to take a look at whether and to what extent best knowledge, best practice and best proven technology can actually attain satisfactory levels of overall environmental and public health security and whether statutes recognize a “no-go” on this basis prior to accepting an application.

Maine’s unique geologic and geochemical characteristics in its few known metallic deposits points up the complexity and challenge of any permitting jurisdiction to develop a legal framework that is both capable of taking these unique inherent risks into account and of arriving at a meaningful assessment of whether these risks can be overcome .

2.1 REFRAMING OF ROOT CAUSES OF LOSS TO LEGAL FRAMEWORK EVALUATAION CRITERIA

To evaluate statutes and regulations for effectiveness in addressing these five key root causes of catastrophic failure requires some translation to language of regulatory standards, expression as statutory/regulatory criteria.

We made these translations as follows.

1.Expert Independent Determination of Economic viability viz global markets Life of Mine (which in Statute or Regulation would be further developed e.g. required for acceptance of an application, including clear standard or method, establishing standards or acceptable methods for evaluating economic viability life of mine, etc)

2. Continual involvement of competent independent expertise in mining economics by both regulator and miner to make the assessment in (1) above. (in statute or regulation would at a minimum be required and provide for long term continuous engagement with the mine rather than brought in at agency's discretion to address specific reviews, submissions or circumstances)

3. The ability of the applicant to attract sufficient capital in a world of ever shrinking quality capital and the presence of an established mining cash flow from other developed assets which are viable life of mine.(In statute or regulation at a minimum would stipulate "financial capacity" as independent expertly verified as both a condition for acceptance of an application as well as stipulating that financial capacity be reviewed annually or by specific review triggers (e.g. a significant change to an adverse investment rating, excessive debt, inadequate cash flow, balance sheet impairing liabilities at other sites. To be effective would also have to provide language providing for intervention and remedy (.see 5 below))

4) Foundations both in law and in self-monitoring/self-regulation of cited command of best knowledge, best practice best proven technology at similar deposits in similar climates (While this mandate in statute and rule is central and governing , there is no single governing universally acknowledged archive. It is issue and problem specific, evolves over time and sometimes what has been widely used and is built into mines all over the world is suddenly revealed to be inadequate and not effective. For example the Mt Polley Failure Review Committee has pronounced slurry deposition of mine tailings, the practice most widely used all over the world for the past 50 or 60 years as an "outmoded technology. (Mt Polley Expert Panel, 2015). At any given point in time however each expert on an independent panel of experts can a priori lay out the main elements for "best practice", Best knowledge" Best proven effective technology in similar climates and geology and geochemistry" as performance standards to which statute and regulation can refer as having the force of statute and regulation. The legal framework can require that the body of work that supports those standards be cited and summarized. At a minimum "best practices" is not the same as "widely used "as stipulated in the Michigan Non Ferrous Mining Rules. To be workable in statute and in regulation it must be dynamic and continually informed. That should also be mandated in statute and regulation. A second important dimension is competence of the miner and its core staff. Without adequate built in mastery through experience in similar geological, geochemical and climatic conditions there can be no meaningful discernment or oversight. BHP, one of the largest mining companies in the world, had no in house geophysical experts and no common policy or framework for its many tailings facilities globally. Only after Samarco did BHP start correcting that.

5) Ability to detect and react soon enough to fundamental changes in global markets that change the economic viability of an already established, operating permitted mine or to emerging conditions within the mine that could escalate to a failure circumstance (Statute and regulation need to provide police powers and clearly indicate the events that warrant use of these powers. Specifying "compliance with this rule" or only specifying specific detection limits will not adequately identify emerging structural weakening or a crashing balance sheet or a major change in the global market place that could have a dramatic effect on the mine's viability. At Iron Cross in New Zealand the parliament met in crisis when they realized they had not reserved sufficient power for themselves to intervene to correct an imminent failure condition**.**

2.2 Evaluation Scoring

To create a basis for comparing among statutes and enable the same rating system for statute as for rules, we adopted a simple 1 to 10 rating system for each catastrophic loss root cause parameter. Almost anyone asked to rate something on a scale of to 10 can do so readily given a reference standard and a significant body of expertise or experience on the subject matter, i.e. "deontically". This is also the rating system developed by Rio Tinto for its financial risk assessment of potential mine sites and investments and utilized by Dr. David Chambers in development of the GO/NO Go technical risk criteria (Chambers 2014).

In this application, a 10 point scale gives room for the variations in language and strategy a given jurisdiction might adopt even aiming at identical standards.

In this application 10 is complete absence of essential reasonably effective provisions ("worst case") and 1,"exemplary". "Exemplary would be a clear recognition of the root cause, a detailed clear mandate for the stated criteria and well developed guidance on attainment of those standards. "5" is "moderately effective" meaning that there are some specific mandates/requirements in the legal framework but the language leaves room for improvement (eg ambiguous through exemptions or modifying clauses, internal inconsistencies or contradictions that leave some room for debate).

changes effected solely through regulation albeit with no contradicting limitations in statute, cannot be fully effective in preventing catastrophic loss.

This approach to rating allows several different approaches by different jurisdictions to have the same rating as long as the measures provided in the legal framework are aimed at root causes, based on global forensics and best knowledge, best practice. (There is no one proven system for translating any of the five criteria to legal code, no one fixed "model language" or approach proven workable under challenge)**.**

A maximum score of 50 is absolute worst case, i.e. no provisions in that sector of the legal framework (statute or regulation) which effectively address prevention of catastrophic failure A "perfect score" of 5 would require that regulation has clear support in statute for each of the 5 catastrophic loss prevention criteria and a clear development of thee mandates in regulation. The purpose of statute is to "steady the helm" of the ship of state, to insulate it against changes in political winds, to reflect the enduring shared fundamental values of governance. So changes effected solely through regulation albeit with no contradicting limitations in statute, cannot be fully effective in preventing catastrophic loss.

The summary scores for each component of the legal framework (statute and regulation) fall into five risk levels as follows:

95% percentile and above (individual component of legal framework(45-50) combined statutory and regulatory 90-100 **"Very High Risk**"; Legal Framework relies entirely on "self-regulation" by the miner, environmental law, and the checks and balances of the market)

90th percentile 38-44 individual component 76-89 combined **"High Risk";** limited effective oversight in statute and regulation for effective detection, intervention and prevention of catastrohpic loss; some useable but indirect mandates little fully developed workable criteria .

50th percentile 19-37 individual component 37-75combined "**Moderate Risk"**; an incomplete legal framework but with some handlholds or bits and pieces which together could be helpful

10th percentile 13-18 individual component 25 to 36 combined **"Acceptable Risk**"; a reasonably complete articulation in statute well developed in regulation with only a few where further improvement in effectiveness or clarity could be made.

"5h percentile 5-12 individual component 10-24 combined statutory and regulatory /**"Exemplary/Low Risk "**; the statute provides clear and well supported mandates addressed to all five criteria which are clearly developed in workable life of mine regulations

The Case study legal framework, Maine, scored 42 "High Risk" for the statute, and 43 also "High Risk for the draft implementing Regulation.. The combined rating of 85 puts Maine at the high end of the range for that category.

Details and basis of rating is provided in Table 1 below

This indicates that accepting applications for advanced exploration, mining, or mine expansion under the combination of existing statute an draft rules as released for public comment would put the state at an avoidably high likelihood of being unable to detect, monitor, or intervene in circumstances on a strongly indicated track to catastrophic loss.

Importantly with no changes in statute Maine could attain a combined score of 58 solidly within the a workable but incomplete range still relying on a high degree of cooperation form the miner and vulnerable to any miner challenges.

The Case study legal framework, Maine, "High Risk" for the statute, and also for the draft implementing Regulation. The combined rating puts Maine at the high end of the range for that category.

*This indicates that accepting applications for advanced exploration, mining, or mine expansion under the combination of existing statute and draft rules as released for public comment would put the state at an **avoidably** high likelihood of being unable to detect, monitor, or intervene in circumstances on a strongly indicated track to catastrophic loss.*

2.0 Conclusion

We have not systematically evaluated and applied this risk of catastrophic assessment to other U.S., Canada Australian and other legal frameworks s but did a quick "thumbnail" pass of about 15 to get a feel for whether the approach made meaningful distinctions and resulted in a bell curve as implied by the scoring system. This appears to be the case. , Maine & Bougainville, and PNG at the far end of greater risk; Michigan and the majority of Canada provinces in the moderate risk range ; South Australia and West Australia at the lower risk end of the curve.

We have a high degree of confidence, however that the ratings assigned here are a meaningful both as a risk assessment for effective catastrophic loss prevention as well as a reliable assessment of Maine's relative ranking in a world community of permitting jurisdictions primarily because the 5 criteria are forensically defined on the basis of over 100 years of history examining all recorded catastrophic failures in that history and commonly

attributed by minings leading experts. In fact in his last work Geoffrey Blight (Blight 2010), one of the most revered of all engineers in the global mining community cited these factors, a study re-examining the root causes of failure at Merriespruit. We are quite confident that a peer review of these five criteria will result in affirmation and consensus and we intend to seek that peer review.

We hope to additionally have three or four independent reviewers, including perhaps present and past legislators on the committee of jurisdiction in the case study state apply these ratings as a sort self- evaluation along with leaders in the responsible mining movement. We hope to get both citizen and expert ratings to compare with ours of the case study State, Maine.. Again we are confident that the peer review will result in scores for statute and for regulation that are within 10% of what Bowker Associates has assigned.

Finally we hope to apply this risk assessment to at least 20 different legal frameworks more formally than the thumbnail sketches of other jurisdictions we did for this case study each also hopefully involving at least 3 independent reviewers for each jurisdiction. This would enable us to test whether there is a normal distribution of scores and to look at the correlation of these scores with the distribution of serious and very serious failures.

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TABLE 1 RISK OF FAILURE ASSESSMENT OF MAINE MINING STATUTE AND DRAFT IMPLEMENTING RULES

Failure Prevention Criteria	Source	Description/Text of Provisions	Risk
1.Expert Independent Determination of Economic viability viz global markets Life of Mine	Statute	No provisions no mention in Criteria for Approval 490-oo section 4.	**10**
	Draft Rule	No provisions BBB. Ore. "Ore" means "any mineral or an aggregate of minerals which can be extracted from the Earth economically." 12 M.R.S.A. §549-A(8). For purposes of this rule, "ore"… may also include previously disposed of or abandoned mine waste from which a metallic mineral or minerals of economic value can be commercially extracted p 6. **A definition is not the same as application criteria or a standard a priori to submittal of an application**	**10**
	Possible	**There is no conflict with present statute to require that no application for mining may be submitted without competent expert mining economist verification of anticipated life of mine economic viability. This would require commissioning an independent expert panel of mining economists and economic geologists to write the performance standards against which future independent experts would evaluate economic feasibility. For example, one major exchange is considering a stipulation that future price assumptions may not exceed average of actual price past five years. That might be a meaningful reference for regulation as well.**	**3**
(2) Continual involvement of competent independent expertise in mining economics by both regulator and miner to make the assessment in (1) above.	Statute	No provisions, recognition or mandate	**10**
	Draft rule	Rule allows Department to hire experts for review of data but does not recognize the need for continuity of oversight by a panel of experts each with specialized expertise of which mining economics is one.(P56, Item H)	**8**
	Possible	There is no specific conflict with present statute to require that a competent mining economist/economic geologist be retained life of mine to assess both internal and external factors affecting economic viability viz global markets and emerging trends. Metallic mining involves a higher level of uncertainty than almost any other human endeavor and that includes economic uncertainty. The higher the grade and the lower the production costs viz global averages of the most recent decade and the stronger the balance sheets of the applicant/permittee the better positioned the mine to weather sudden external economic shocks	**4**

TABLE 1 cont RISK OF FAILURE ASSESSMENT OF MAINE MINING STATUTE AND DRAFT IMPLEMENTING RULES(2)

Failure Prevention Criteria	Source	Description/Text of Provisions	Risk
(3) the ability of the applicant to attract sufficient capital in a world of ever shrinking quality capital and the presence of an established mining cash flow from other developed assets which are viable life of mine	Statute	Requires demonstration of financial capacity (490 oo Criteria for Approval) but provides insufficient guidance and statutory standards. New technology has not kept up with increasing production volumes needed with ever lower grades. High unit production costs mean mines no longer are self sufficient through own revenue generation. Larger mines are borrowing just to stay in production.	**6**
	Draft rule	No specific provisions or standards; some development of the statutory mandate and a broad scope/general performance standard but not sufficient clarity "(11) Financial Responsibility Plan. (a) Financial capacity to construct, operate, reclaim, close, and conduct post-closure maintenance at the site and to cover the corrective action costs of a "credible accident" in accordance with 06-096 CMR 373(1) and other applicable laws;" P 47 not applicable ; no standards or criteria on how the laundry list will be applied in accepting or rejceting and in ongoing monitoring and oversight (1) The Applicant has the authority, financial capacity, and technical ability to develop the proposed mine in a manner consistent with applicable state environmental standards and with the provisions of this Chapter and the Act " a closed system none of the standards referred to are related to the 5 key criteria; a slight modification could fix through development of the criteria for technical ability and financial capacity	**5**
	possible	The statue has a clear mandate that applicants demonstrate financial capacity. Although reasonable and applicable ,modified mining specific language of Site Location of Development Law previously applicable to "Financial Capcity " mining was not carried over into pl 2011 C.653 (Site of Development language: "The commissioner may issue a permit under this article that conditions any site alterations upon a developer providing the commissioner with evidence that the developer has been granted a line of credit or a loan by a financial institution authorized to do business in the State as defined in Title 9-B, section 131, subsection 17-A or with evidence of any other form of financial assurance the board determines by rule to be adequate.) Private placement and pawn shop debt which is strangling the majority of junior and midsized miners does not evidence "financial capacity". Company must be an experienced ***mining company*** listed in a major exchange with an average rating of B+ or better, have lines of credit for existing mining operations with regulated reputable rated financial institutions. This capacity can change suddenly or begin a significant decline from the economics and liabilities of other mining assets and must be continually monitored and assessed life fo mine by qualified experts in mining economics. BHP and Vale, co- owners of the failed Samarco mine in Brazil both would have passed even the highest standards of financial capacity (Brazils law provides for joint and several liability with parent company/owner Samarco was rated BBB by Fitch in 2009 when it put the Fundao into service) http://www.businesswire.com/news/home/20090717005608/en/Fitch-Affirms-Samarcos-IDRs-BBB-Outlook-Stable	**3**

TABLE 1 cont RISK OF FAILURE ASSESSMENT OF MAINE MINING STATUTE AND DRAFT IMPLEMENTING RULES(3)

Failure Prevention Criteria	Source	Description/Text of Provisions	Risk
4) Foundations both in law and in self -monitoring/self- regulation in combination of cited command of best knowledge, best practice best proven technology at similar deposits in similar climates	statute	Statutory mandate for proven efficacy of technology; closely comparable to best knowledge best proven technology at similar deposits not the same	**7**
	rule	Draft rule adds nothing to clarify or provide further guidance on this important statutory mandate effectively nullifying the statutory mandate additionally drops a best practices standard in the existing 1991 rule: (4) Performance Requirements for Soils and Surficial Materials (a) Best management practices shall be required to control fugitive emissions and other contamination into or upon any land (p61 1991 rules)	**10**
	possible	**With few exceptions catastrophic mine failures in history have been attributable to deviation from best knowledge , best practice, best proven technology in similar deposits with similar climates. In addition to having "best practice, best knowledge, best proven technology" as a explicitly stated or cited standards, an effective rule must state what those standards are and provide for competence via an expert independent panel life of mine accountable to the public interest. There are no statutory obstacles and some support in the mandate for proven effective technology and the mandates for no offsite degradation of land, waters, habitat or public health .**	**2**
5) ability to detect and react soon enough to fundamental changes in global markets that change the economic viability of an already established, operating permitted mine	statute	The mining statute did not carry over the police authority in site of development law; eliminated the police intervention provisions of site of of development law that previously applied to metallic mining ; did not add risk triggers, red flags or other criteria for noticing when a significant change or event has happened that may "seed" a chain events culminating in failure. **The statute cites only non-compliance with explicit permit standards. Imperial Metals (Mt Polley) was found not to be in violation of any permit terms and conditions even though its insistent deviation from the original tailings impoundment design established and pursued a chain of circumstances culminating in catastrophic failure.** (Mt Polley Expert Panel 2015) **The non- compliant event (the environmental damage) is the result of these seeds of failure. Police action/stop work has to be based on the documented/indicated presence of a condition posing a significant risk of failure.**	**9**
	rule	The draft rule dropped the much clearer and more effective language of the 1991 rule	**10**
	possible	There are no statutory provisions which preclude the delineation of risk triggers or risk events which have been known to "seed" major failure. It would take an expert inter-disciplinary panel to identify and vet what those key triggers are so that they might be included in the rule.	**4**

TABLE 1 cont RISK OF FAILURE ASSESSMENT OF MAINE MINING STATUTE AND DRAFT IMPLEMENTING RULES(4) SUMMARY

Failure Prevention Criteria	Source	Description/Text of Provisions	Risk
	Statute	Statute itself is a main contributor to risk of failure and associated unfundable public liability and non remediable prmananet loss to water land, habitat and species. It fails to set clear mandates and standrds	**42**
	Drft Rule	The drfat rule does not include a full development/application of the few strengths n the staute that could help prevent catstrophic failures. It drops better and strnger protections of the 1991 rule that are ntin any way in confoct with present statute (Pl 2011 C653) and fails to take advatantage	**43**
	possible	Without any cnages in present staute risk of failure and unfundede unfudable public liablity the rule alone could significantly lower risk of failure	**16**
	combined		**85**

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that many developments because of their size and nature are capable of causing irreparable damage to the people and the environment on the development sites and in their surroundings; that the location of such developments is too important to be left only to the determination of the owners of such

developments; and that discretion must be vested in state authority to regulate the location of developments which may substantially affect the environment and quality of life in **§490-H. Enforcement and penalties**

Except as provided in section 490-I, the department shall administer and enforce the provisions of this article. [1993, c. 350, §5 (NEW).]

1. Stop-work order. The regulator may order the owner or operator that is not operating in compliance with this article to cease operations until the noncompliance is corrected.

[1995, c. 700, §28 (AMD) .]

2. Penalty. A person who violates the provisions of this article commits a civil violation and is subject to the penalties established under section 349. Penalties assessed for enforcement actions taken by the State are payable to the State and penalties assessed for enforcement actions taken by a municipality registered under section 490-I are payable to that municipality. For any action brought by a municipality under this article in which the municipality prevails, the court may require the owner or operator to reimburse the municipality for costs associated with that enforcement action.

[1993, c. 350, §5 (NEW) .]

Maine. (Title 38, Section 481 findings & Purpose)

1991 rule Police action

2) Duty to Comply. The permittee must comply with all conditions of the permit. Any noncompliance constitutes a violation of law and is grounds for enforcement action, for permit suspension or revocation, and for denial of a renewal application (p 14 of 85 under "Standrad Conditions"

(8) Permit Actions. The permit may be modified, suspended, or revoked by the Department and/or Commission as provided under the Maine Administrative Procedure Act, 5 M.R.S.A. §§8001, *et seq*., or other applicable law. The filing of a request by the permittee for a permit modification does not stay any permit condition.

10) Duty to Provide Information. The permittee shall furnish any information which the Commissioner or Director requests in order to determine whether cause exists for modifying, suspending, or revoking the permit; or to determine compliance with the permit. The permittee shall also, upon request, furnish to the Department and/or Commission copies of records required to be kept by the permittee, and not otherwise required to be filed with the Department and/or Commission.

13) Noncompliance and Occurrence Reporting. The permittee shall report to the Department and/or Commission any noncompliance; and any unpermitted or otherwise unlawful release or discharge of pollutants, fire or explosion at the site. Information shall be provided orally within 24 hours from the time the applicant becomes aware of the circumstances, and in writing within 5 working days. If the noncompliance, release or discharge of pollutants, or cause of fire or explosion has not been corrected, the anticipated time it is expected to continue shall be given, together with the steps taken or planned to reduce, eliminate and prevent recurrence. The written submission shall include the following:

AA. A list and explanation of any felony convictions, any criminal convictions of environmental and land use laws, and any civil violations of environmental or land use laws administered by the Department, the Commission, the State, other states, the United States, or another country, in the 10 years immediately preceding the filing of the application; and

BB. A list and explanation of administrative consent agreements or consent decrees entered into by the applicant or related persons including alleged violations of environmental or land use laws administered by the Department, the Commission, the State, other states, the United States or another country, in the 10 years immediately preceding the filing of the application.

(5) Mining Experience. A list must be provided of all mines controlled or operated by the applicant, or related persons, in the world. This list shall include mine site addresses, nature and duration of affiliation with the site, and a brief description of each mine.