

# *The Path to Zero Failures*

**Health, Safety and Reclamation Code  
Review**

## Acknowledgements

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Fair Mining Collaborative is grateful to: the Real Estate Foundation, MiningWatch Canada, Glenn Grande, Ethan Krindle, and Maya Stano.



*MiningWatch Canada*  

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*Mines Alertes*



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## Who Is Fair Mining Collaborative?

Fair Mining Collaborative (“FMC”) is a charitable foundation that provides values based, credible, technical, and strategic guidance to communities, First Nation leadership groups, industry, and political decision makers, with the intention of helping them build capacity to make informed land-use decisions that foster healthy sustainable communities and ecosystems. While we assist clients with reaching their intended outcomes, we do not advocate for a particular outcome.

FMC collaborates with international organizations such as Global Exploration Minerals and Mining, the Initiative for Responsible Mining Assurance, the Responsible Minerals Sector Initiative and Advocates for International Development. FMC helped form the Trans-Boundary Working Group, made up of 14 NGOs and 4 First Nations and tribal groups, representing both sides of the Alaska / BC border.

FMC also collaborates with various other NGOs (MiningWatch Canada, Northern Confluence, West Coast Environmental Law, Ecojustice Canada, Headwaters Initiative, Canadian Boreal Initiative, Clayoquot Action Society, Friends of Nemiah Valley, Sierra Club BC, Rivers Without Borders), the University of Victoria Environmental Law Centre, Thompson Rivers University, Amnesty International, and independent scientists.

Key FMC publications include *Fair Mining Practices: A New Mining Code for British Columbia* and *The Mine Medicine Manual: A Community Resource*. FMC also consulted on the *Northern Secwepemc te Qelmucw Mining Policy*, which has gained international attention in the wake of the Mount Polley mine disaster as one of the world’s best mining policies for Indigenous communities.

FMC has developed an interactive, hands-on training program called the *Fair Mining Training Program* based on our *Mine Medicine Manual* to build capacity for First Nations, communities, and other groups in BC dealing with mining - to implement their own mining policies in practical, day-to-day contexts, and to understand mining processes and mining laws in BC.

For more information, visit our website at [www.fairmining.ca](http://www.fairmining.ca).

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## EXECUTIVE SUMMARY

Translating wise and provable insight into wise and workable legislation is a challenging process requiring highly skilled people from many sectors. FMC took the first step in *Fair Mining Practices: A New Mining Code for British Columbia* by undertaking a trans-jurisdictional analysis in search of the world's best mining practices and noting the legislation and supporting research around each, then presenting them as suggestions for adoption in British Columbia. Additionally, the Northern Secwepemc Tribal Council has incorporated many of these suggestions into their *Northern Secwepemc te Qelmuw Mining Policy* (<http://northernshuswaptribalcouncil.com>).

In this submission to the Health, Safety and Reclamation Code Review Committee (the “**Committee**”) we have proposed amendments to the *Health, Safety and Reclamation Code* (“**HSRC**”) and the *Mines Act* (with reasons for including both) that will best achieve the Mount Polley Independent Expert Engineering Investigation and Review Panel’s (“**MPRP**”) recommendations, and help prevent another tailings storage facility (“**TSF**”) failure. And even if the precise wording and placement of our proposed amendments is less than perfect, our hope is the ideas behind them will nevertheless inspire the Committee and legislators going forward.

Our submission is a section-by-section capture of selected provisions in the *HSRC* and *Mines Act* flagged by FMC whenever any of the following conditions are present:

1. the provision is directly affected by the MPRP recommendations;
2. the provision presents a public safety and/or environmental concern we feel is contrary to the Purpose of the *HSRC*; or
3. the provision creates potential liabilities for miners or the taxpayers of BC that could otherwise be avoided.

The focus of our submission is on the following:

- a. incorporating Best Applicable Practices (“**BAP**”) and Best Available Technology (“**BAT**”) as part of the statutory regime by setting these as minimum threshold requirements;
- b. creating a role for qualified designated community representatives to participate in the mining process and address the social and public safety concerns raised in the MPRP recommendations;
- c. strengthening mandatory securities, and requiring securities for emergencies;
- d. taking the MPRP recommendation for Independent Tailings Review Boards (“**ITRBs**”) and creating one publicly accountable ITRB under the *Mines Act* to manage the provincial TSF inventory, strengthen decision making, and increase transparency;
- e. enabling the creation and function of tailings advisory committees.

In our submission we have linked proposed amendments to the applicable MPRP recommendation, and connected many proposed amendments to “Related Legislation”- alerting the Ministry to legislative provisions found within other BC statutes, regulations, policies, or guidelines that either contemplate the same mining issue, or may be affected by an amendment to mining legislation. On some pages under the heading “Authority /Reference”, our proposed amendments include supporting statutes from other jurisdictions and case law.

While the path to zero failures of tailings storage facilities is both necessary and complex, FMC strongly believes that it can only be achieved by:

1. Broadening the scope of the current *HSRC* review to also address important gaps in other B.C. mining statutes, including (but not limited to) the *Mines Act*, *Mineral Tenure Act*, *Mineral Tenure Act Regulations*, *Environmental Management Act*, *Water Act*, and *Water Regulation*.
2. Phasing out industry self-regulation by integrating clear, enforceable language in legislation, and by creating a permanent, provincial Independent Tailings Review Board and temporary tailings advisory committees to assist with and oversee the management of all tailings storage facilities in British Columbia
3. Recognition of the duty to meaningfully consult with and accommodate First Nations, and the recognition of First Nations' inherent right to self-determination, self-governance, and free, prior and informed consent to mining projects in accordance with the United Nations Declaration of Rights of Indigenous Peoples.
4. Working together with regional and municipal bodies, labour, and environmental organizations to support and implement all of the MPRP's recommendations and thereby improve mining activities throughout their life cycle, from staking to development, through to production and closure.
5. A move from conventional saturated tailings production to paste or thickened tailings using Best Available Technologies.
6. Strengthening securities by making all securities mandatory, including securities for emergencies, and securities for potential failures; established through a full cost accounting at the outset of mining projects.

# INTRODUCTION

The report of the Mount Polley Independent Expert Engineering Investigation and Review Panel (The “Mount Polley Review Panel” or “MPRP”) from which the Terms of Reference for review of the *Health, Safety and Reclamation Code* (“HSRC”) are drawn, states with great clarity that the era of conventional tailings storage in an upstream design is over for new mines in British Columbia.

The central question for all British Columbians now is, “How do we prevent anything like the Mount Polley breach from ever happening again?”

As we reset the table for mining, we cannot ignore the fact that millions of cubic metres of tailings have supplanted the natural landscape, settled at the bottom of Quesnel Lake, and are leaching into the Fraser River watershed. The current reclamation efforts suggest these tailings will remain a menace in perpetuity to local residents and First Nations from the Cariboo to the Lower Mainland and beyond as out-migrating salmon disperse to Vancouver Island, the Pacific Northwest, and Alaska.

We are confident that we can create meaningful and necessary change going forward, and we can do so without endangering jobs or threatening the economy. In fact, securing a robust, clear, and effective new mining framework by implementing the seven recommendations of the MPRP will, in fact, boost the industry, as investors, now suddenly wary or averse to mining, can rebuild faith after having their confidence shattered on August 4th, 2014.

Like all businesses, a mining company’s first priority is economic health in order to ensure its existence, profitability, and continued growth. And like most corporations, the main expertise of mining companies does not rest in public safety, or stewardship of the environment, although hints of both may be emerging, driven by a greater-than-ever need to obtain the social license necessary to operate. Actions in the next year by the mining industry as a whole, individual companies, and the BC government will determine whether the shift toward social responsibility and sustainability is due largely to buttress the first priorities with better optics, or from a genuine desire to do good. The Mount Polley breach has demonstrated that industry will not save us, and has also loudly and clearly sounded the end of another era in British Columbia: mining industry self-regulation.

Mount Polley is the seminal case study where a mining company lost sight of sustaining long-term benefits, environmental protection, and social stability in favour of short-term profitability by choosing (and being permitted to build) an upstream design dam for conventional tailings storage and compensating for this defect with ad hoc, patchwork, in-house oversight, for which it was granted near autonomy by regulators.

Using decades-old evidence, the MPRP suggests that the choice of the conventional tailings storage method, in order to increase short-term profitability ran contrary to better alternatives available at the time. The MPRP also emphasizes that much better technology is certainly available in 2015 and the choice now is clear: “While economic factors cannot be neglected, neither can they continue to preempt best technology.”<sup>1</sup>

The case for change is brought home by the simple, undeniable fact that a good portion of the decades of profitability attained by using the cheapest alternative for tailings storage was washed away in minutes on August 4<sup>th</sup>, 2014. It caught up to the mining company - to all of us - and resulted in a scenario where everyone lost: the company; its employees and shareholders; local citizens and business owners; neighbouring miners;<sup>2</sup> First Nations; the government; and industry.

Although a step in the right direction, the use of Best Available Technology and Best Applicable Practices alone will not suffice to prevent another catastrophic failure. Research clearly shows that the drive to mine lower grade ores in higher volumes to meet global demand against a volatile market, foments the conditions that place undue stresses on tailings facilities.<sup>3</sup>

In addition, the social operating license remains encumbered by the continuing uncertainty over the approach used in building relationships with First Nations; hampered by issues that begin much earlier in the mining process than tailings production and storage.

In this submission, we delve into specific provisions of the *HSRC* and the *Mines Act* that we recommend be amended to implement the MPRP recommendations, and to build a safer, and more socially acceptable mining industry in BC.

In our Introduction, we highlight 4 key issues that have emerged from our review:

1. The single-statute review vs. connectivity of all mining legislation
2. Mandatory legal requirements vs. discretionary requirements in the *HSRC*
3. Placement of TSF provisions and provisions on exploration in a health and safety regulation
4. Consistency and effective application in compliance and enforcement

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1 “Report on Mount Polley Tailing Storage Facility Breach”, Independent Expert Engineering and Review Panel (Government of British Columbia, Queen’s Printer, 30 January, 2015) at 123.

2 The outflow from the Mount Polley mine breach cut north-west to southeast down Hazeltine Creek across the full width of a valid 500 hectare mining claim owned by Serengeti Resources of Vancouver, effectively severing the claim in half, destroying a claim surface area approximately 2km long by 100m wide.

3 Lindsay Newland-Bowker, & David M Chambers, “The Risk, Public Liability & Economics of Tailings Storage Facility Failures”: provides empirical evidence that links the drive for lower grade deposits in the latter half of the twentieth century has contributed to the increase in what the researchers measure as “Serious” and “Very Serious” tailings dam breaches.

## 1. THE SINGLE-STATUTE REVIEW

FMC has identified a critical issue regarding the scope of the Terms of Reference (“ToR”) for the Health, Safety and Reclamation Code Review Committee (the “Committee”) - one we have already touched upon: the vision inspired by the seven recommendations of the MPRP will not be fulfilled through a review of the *HSRC* alone.

Rather than a finding of fault, this is an important legal issue. If the Ministry of Energy and Mines elects to amend a provision of the *HSRC* in order to address one area of legislation but neglects to address or amend provisions in other legislation that also contemplate the same issue, it will create inconsistency and imbalance along the breadth of mining legislation governing that issue and all associated processes. This will have the unanticipated effects of creating uncertainty for industry and unnecessarily exposing taxpayers and miners to potential liabilities. Section 1.1.3 (Conflicting Codes) will not save the *HSRC* in every situation. This is especially true considering the relationship between the *Mines Act* and the *HSRC*. The way in which these two statutes operate precludes the effectiveness of a single-statute review since the *Mines Act* enables the *HSRC* and changes in the latter simply cannot be made without amending the former. And this matter is not isolated to those statutes but extends to other mining statutes, regulations, policies, and guidelines applicable to mining activities in British Columbia.

As an example, consider the MPRP’s recommendation #6, which reads:

“Encourage the APEGBC to develop guidelines that would lead to improved site characterization for tailings dams with respect to the geological, geomorphological, hydrogeological and possibly seismotectonic characteristics.”<sup>1</sup>

The Association of Professional Engineers and Geoscientists of British Columbia improving its guidelines could be received by BC mining legislation in a number of ways such as amending section 10.1.4 of the *HSRC*, which sets out the information that must be included in a permit application, to require hydrogeological and seismotectonic data. However, Schedule A section 8(8) of the *Mineral Tenure Act Regulation* also addresses the collecting of geological data, as does Appendix I section 2.2.2 of the provincial policy document “Application Requirements for a Permit Approving the Mine Plan and Reclamation Program Pursuant to the Mines Act”. Requirements for geological and geomorphological data requested under #6 are already captured in current provisions, but the requirements for hydrogeological and seismotectonic data are conspicuously absent throughout all current provisions. Thus, to ensure consistency across mining legislation, these provisions should also be amended together at once, not solely in the *HSRC*.

This is but one example highlighting the importance of a broader statutory review of all legislation, policies, and guidelines in BC to ensure clarity and consistent application of mining laws throughout all stages of the mining process.

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<sup>1</sup> “Report on Mount Polley Tailing Storage Facility Breach”, Independent Expert Engineering Investigation and Review Panel (Government of British Columbia, Queen’s Printer, 30 January, 2015) at 140.

## 2. LEGAL WEIGHT OF THE HSRC PROVISIONS

Another substantial drawback to the *HSRC* is its reliance on the ‘honour system’ between miners and the regulator.

Unfortunately some mining companies see mining law as obstacles requiring shortcuts and will choose to ignore or circumvent those perceived obstacles. When it comes to directing miners, especially regarding tailings storage facilities (where the stakes are arguably highest), the code contains very broad terminology which does little to encourage compliance. For example, the *HSRC* downloads monitoring, oversight, and compliance onto industry and engineers, in the hope they will honour industry standards such as the Canadian Dam Safety Guidelines, without any consequence if they choose otherwise.

FMC has noticed the same tacit reliance on the honour system in MPRP recommendation #6 (previously cited): “encourage the Association of Professional Engineering Geoscientists of BC to develop guidelines that would lead to improved site characterization for tailings dams ...” What is ‘encouragement’ in this context? Will not more encouragement simply keep BC mining law in its pre-Mount Polley form? The same is also true of the phrase “good engineering practice” appearing in the *Mines Act* and throughout the *HSRC*. What is “good engineering practice”? Ten engineers will likely give ten different answers. Discretionary legislative language provides flexibility when needed, but in this case it allows the inconsistent application of mining laws, which can become fertile ground for another TSF failure.

We caution that while the MPRP recommendations present a strong foundation for positive change, the mere suggestion of ‘encouragement’ can become a euphemism for a hand-off of decision-making power - a model we have seen simply does not work. Statutory provisions - especially when they govern the potential destructive capabilities of an improperly designed and managed TSF - must be clearly defined and uncompromising. Without clear legislative provisions mandating only the highest standards, no certainty exists for mining companies to take the time and spend the money to ensure safe operation of TSFs - as evidenced in the Mount Polley disaster. And even if one mining company did act unilaterally in this regard, universal application of one company’s chosen higher standard is difficult if not impossible without strong, clear and enforceable legislation.

Therefore, we have proposed amendments that help resolve some of the broad language and tenuous connections between legal directives and desired results, by giving more legal force and clarity to the *HSRC*, and to our amendments and associated provisions in its governing statute, the *Mines Act*.

### 3. ARE TSF PROVISIONS SITUATED FOR MAXIMUM EFFECTIVENESS?

The current version of the *HSRC* is the latest edition of a code dating back to the 1970s. Its last overhaul occurred from 2006-2008 in response to the tragic deaths of four people at the Sullivan Mine near Kimberley BC in May 2006. Fortunately, the Mount Polley breach, which has triggered the latest review of the code, did not result in any immediate deaths, but the catastrophic failure of the perimeter embankment of the Mount Polley mine tailing storage facility (which nonetheless likely killed hundreds of living creatures) was disaster enough to compel another review of the *HSRC*.

The primary focus of the *HSRC*, however, is evident in Parts 1 to 8, which deal exclusively with the health and safety of personnel. Part 10 (Reclamation and Closure) seems to exist somewhat out of place, like an afterthought in a document unsuited to the purpose of containing it. This raises the question: Was BC's only legislation around tailings storage facilities placed in a worker safety regulation because the drafters believed the only hazards from a TSF faced *inwards*?

We submit that one of the silent contributing factors to the Mount Polley breach is the placement of the regulatory framework for TSFs in the *HSRC* in the first place. TSFs involve deep and complex issues around technology, design, construction, operation, maintenance, and closure, thereby demanding unique, meticulous statutory treatment.

A repositioning of TSF law into its own statute would encourage a more detailed and substantive review, and correspondingly, more detailed and substantive provisions that would effectively implement the MPRP recommendations. FMC therefore strongly submits that Part 10 of the *HSRC* should be moved into its own statute.

Part 9 of the *HSRC* (Exploration) is another section also worthy of the same analysis.

Part 9 is also adjunct to the code's greater purpose of protecting the health and safety of personnel and the public. Only 1 of its 13 sections directly covers safety, leaving the other 12 sections to govern the conduct of mineral exploration. Although a few sections in Part 9 can apply to exploration associated within an operating mine surveying for expansion, its primary focus is on exploration before a mine is constructed. Notably, Part 9 also contains the only statutory riparian setback provision with any numeric substance in all BC mining legislation.

Given the way in which Part 9 and Part 10 seem misplaced in BC mining legislation, we strongly recommend removing Parts 9 and 10 from the *HSRC*, and placing them in two separate statutes: a robust *Tailings Management Regulation*, and an equally effective *Exploration Regulation*. Each new regulation would operate alongside a strengthened *HSRC* under the *Mines Act* in order to provide the latitude and legislative room for the Best Applicable Practices and Best Available Technology, as well as all the remaining recommendations of the MPRP.

However, in lieu of separate pieces of legislation for Parts 9 and 10, we make our submission herein to the *HSRC* as it stands.

#### 4. COMPLIANCE AND ENFORCEMENT

The MPRP examined the role of the “Regulator” - the Ministry of Energy and Mines - and found: “... the regulatory staff are well qualified to perform their responsibilities [and] the performance of the Regulator was as expected.”<sup>1</sup>

This statement is not untrue. Performance of regulatory duties alone cannot prevent TSF failures. Compliance with orders issued as a result of those duties (like inspections) however, can and do prevent TSF failures. Vigilant oversight and intervention during TSF design stages, alterations in those stages, and oversight and intervention on changes that increase production into a TSF not equipped to handle the load, will each bear great influence on deciding whether or not a TSF will fail.

When a TSF is moving through its design phases, regulating TSF design becomes an entirely different challenge for an inspector.<sup>2</sup> An inspector can be out of his or her depth, and under the current statutory regime the Engineer of Record (“EOR”) then becomes a de-facto regulator, albeit without any statutory authority. This creates the critical dichotomy of a regulator with enforcement powers but not enough expertise, and a TSF expert with no regulatory authority.

The MPRP notes “the relationship between the Regulator and the EOR can result in different opinions being expressed that are not easy to resolve without independent input. In such circumstances, independent external advice could be sought ...”<sup>3</sup> FMC submits that after the Mount Polley breach such advice *must* be sought. Therefore, in this submission we have proposed provisions for both tailings advisory committees (“TACs”) and an Independent Tailings Review Board (“ITRB”) to assist the chief inspector, and build oversight into the regulatory framework.

At first blush, current legislation seems to indicate a fairly strong compliance and enforcement framework in the *Mines Act*. Section 15 mandates inspections; section 34 sets a healthy, court-backed enforcement mandate, and section 37 denotes penalties for compliance failure.

However, as noted by the MPRP, several of the *HSRC*'s current provisions fail to ensure effective compliance in their practical application. As such, critical points are being missed by mine operators somewhere along the line from the recommendations within the legal provisions to the implementation of their intent.

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1 “Report on Mount Polley Tailing Storage Facility Breach”, Independent Expert Engineering Investigation and Review Panel (Government of British Columbia, Queen’s Printer, 30 January, 2015) at iv.

2 There is a difference between regulating construction and regulating design after it has been approved. The Regulator by observation and experience has the capacity to regulate construction but does not have the capacity to modify the design. Regulators are not normally recruited with specific dam design experience and are limited by statute in their capacity to take on design responsibilities. This role resides with the EOR.

3 This statement is the precursor to the MPRP recommendation for an Independent Tailings Review Board to aid in recapturing post-approval design regulatory powers back into the inspectors’ legislative purview and out of the hands of engineers.

Therefore, we have proposed statutory changes mandating regular inspections and compliance with the recommendations of the last engineer’s inspection report (“**EIR**”). We have also proposed new provisions that seek to define the “reasonable measures” a miner must undertake to comply with an order, an option for the chief inspector to bring in outside assistance, as well as recovery of costs to save funds in the public purse. Finally, we also propose removing an inspector’s discretion in the enforcement of orders under section 35. We offer this not only to boost enforcement, but as a sign of support for the role of inspector who, upon finding an issue worthy of a remedial order, should be able to do so in confidence, and enjoy the full support of the law in seeing the order carried through. We have also added a new subsection to section 35 denoting higher fines for non-compliance.

The following sections outline FMC’s recommendations for proposed amendments to the *HSRC* and other parts of the statutory framework governing mining in BC. We have generally limited our review to the scope of the HSRC Code Review Committee ToR but have noted places where we believe a slight deviation from the MRPR recommendations will best ensure clarity and effective governance of mining in BC.

Fair Mining Collaborative submits the following recommendations as proposed amendments to the *HSRC*, and to all legislation, regulations, guidelines, and policies mentioned herein.

*Health, Safety  
and Reclamation  
Code*

**PROPOSED  
AMENDMENTS**

We begin by proposing the “Purpose” of the *HSRC* be amended to reflect the intent of the MPRP that economic considerations can no longer supersede the use of Best Applicable Practices and Best Available Technology.

**Amended**

PURPOSE

The purpose of the Code is to:

- (1) Protect employees and all other persons from undue risks to their health and safety arising out of or in connection with activities at mines.
- (2) Safeguard the public from risks arising out of or in connection with activities at mines, *with special attention to the application of Best Applicable Practices and Best Available Technology to tailings production and storage.*
- (3) Protect and reclaim the land and watercourses affected by mining.
- (4) Monitor the extraction of mineral and coal resources and ensure extraction with a minimum of environmental disturbance, *by mandatory adherence to the Best Applicable Practices and Best Available Technology as defined in this code and the Act above all other priorities.*

*Health, Safety and Reclamation Code*

**PART 1**

**Application of the Code and General Rules**

Sections 1.2.2 and 1.2.3 of the *HSRC* contemplate applications for variances from provisions of the Code for particular mines. This may include a variance for a TSF and as such should be subject to review by the Independent Tailings Review Board under MPRP recommendations #3(c) and #4, rather than being deferred to the sole authority of the chief inspector who may not possess the technical qualifications to make the most informed decision using either BAP or BAT guidelines in every given situation. Therefore, we propose two new subsections to section 1.2.2 specifying third-party review for variances pertaining to items under application for variance connected in any way to TSFs.

We also propose two additional sections: one under section 3 of the *Mines Act* to allow for the creation of a public Independent Tailings Review Board (“ITRB”), and another under section 9 of the *Mines Act* to allow for the creation of temporary Tailings Advisory Committees (“TAC”) as needed. We also propose provisions for the latter in a new *HSRC* section (10.3.4), to permit the expertise of these sub-committees to aid the chief inspector in different stages of TSF related issues.

The two-pronged approach to reviewing TSF applications (ITRB & TAC) provides options to aid in highly technical decisions, and enhance regulatory oversight envisioned under MPRP recommendation #5. This amendment further helps to improve corporate governance and incorporate specific BAPs and BATs into law in order to enhance regulatory capacity in accordance with the Mining Association of Canada (“MAC”) Guidelines<sup>1</sup> and the improved Canadian Dam Association (“CDA”) Guidelines<sup>2</sup>.

### New Subsections

- 1.2.2** A variance may only be made if the chief inspector has considered any comments subject to 1.2.3(3), and is satisfied that the variance [...]
- (c) *has been referred to the Independent Tailings Review Board for final review under section 3.1 of the Mines Act if it concerns any tailings storage facility or other impoundment, and*
  - (d) *has been approved by the Independent Tailings Review Board in accordance with the final review in (c).*

Related Legislation		
Statute	Section	
<i>Mines Act</i>	1	Definitions - new “ <i>Independent Tailings Review Board</i> ”
<i>Mines Act</i>	3.1	New - Independent Tailings Review Board (formation of)
<i>HSRC</i>	10.1.11	Departure From Approval
<i>HSRC</i>	10.3.4	New - Tailings Advisory Committee (function of)

<sup>1</sup> “Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities, 2011” (Mining Association of Canada, 2011, Ottawa); “A guide to Audit and Assessment of Tailings Facility Management, 2011” (Mining Association of Canada, 2011, Ottawa); “A Guide to the Management of Tailings Facilities, Second Edition, 2011” (Mining Association of Canada, 2011, Ottawa).

<sup>2</sup> Canadian Dam Association, “Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams, 2014”, (Canadian Dam Association, 2014).

Designated Community Representative



MPRP recommendation #2 envisions improved corporate governance through the adoption of the MAC guidelines and programs.

MPRP recommendation #3 calls for an expansion of corporate design commitments for future TSF permit applications which considers, among other things, the “social and economic aspects of the project in sufficient detail to support an investment decision”.

MPRP recommendation #7 calls for improved dam safety guidelines “that emphasize protecting public safety”.

To help implement these recommendations we propose an amendment to section 1.3.1 of the HSRC by creating the position of, and granting authority to, a qualified and designated community representative from an affected community of interest to access the mine site. Without a clear definition of “Community of Interest” we defer (in part only) to the contextual usage of the term in the MAC Guidelines and offer more specific terminology:

*a community of interest is any community<sup>1</sup> within the geographic, environmental, or economic sphere of mining activities where any significant exploration activity, or development, operation, closure, or post-closure activities of a mine may directly impact the community, its people, and/or its surrounding environment.*

Our proposed amendment also refers to a set of liaison protocols (described on the following page) to help guide the relationship between mine staff and the designated community representative.

Current	Amended
<p><b>1.3.1</b> Other than an inspector, only persons authorized by the manager shall enter or be permitted to enter a mine.</p>	<p><b>1.3.1</b> Other than an inspector, <i>and a qualified designated community representative acting in accordance with the liaison protocols</i>, only persons authorized by the manager shall enter or be permitted to enter a mine.</p>

Related Legislation		
Statute	Section	
<i>Mines Act</i>	1	Definitions – new: “ <i>designated community representative</i> ”
<i>Mines Act</i>	3.3	New: Designated Community Representative

<sup>1</sup> FMC neither includes nor expressly excludes First Nations from the definition of “community of interest” out of respect for the fact each First Nation will exercise its own right as its own government, and that First Nations must be respected on a government-to-government basis. Where applicable in this document, FMC endorses First Nations’ unique position as title claimants and constitutional rights holders and holds that their needs must be respected in that framework as a first priority.

## Liaison Protocols

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To strengthen engagement with local communities, FMC proposes a definition for “Liaison Protocols” similar to the definition set out in the *Northern Secwepemc te Qelmuw Mining Policy*:

### ***Liaison Protocols***

Protocols for communication, information exchange, reporting requirements, and on-going liaison throughout the duration of the life of a mine, including requiring the proponent to:

- provide regular (e.g. quarterly) updates/progress reports on exploration activities and mine activities (ongoing and proposed);
- notify the community of any new authorizations or permits when they are applied for and if they are approved;
- develop and implement an environmental monitoring plan;
- provide all monitoring data in electronic format, with photographs where applicable, and allow uninhibited access, on reasonable notice, to perform site inspections with a clear, agreed-upon list of any safety concerns of any of the parties that would prevent or delay this. For First Nations, the option to re-schedule site inspections should remain open as part of the duty to accommodate.

### **Authority / Reference**

*Fair Mining Practices: A New Mining Code for British Columbia*, p 27.  
*Northern Secwepemc te Qelmuw Mining Policy*, Appendix C, section 1.  
*Taku River Tlingit First Nation, Mining Policy*, Schedule E.  
*Teslin Tlingit Council, Mining Policy*, Schedule E.

**Employee Responsibility to Report Tailings Storage Facility Hazards**

3 c 5 7

Consistent with MPRP recommendation #3(c) and its call for Independent Tailings Review Boards (and FMC's call for a single ITRB and the use of TACs), HSRC provisions dealing with front-line workers' first-hand knowledge of TSF behaviour and any reports concerning those observations should be part of the regulatory body's record and made immediately available to the ITRB and TAC.

Fear of reprisal should never stand in the way of providing notification of concerns regarding a TSF or mine operations. However, evidence indicates employee, contractor, and inspector reporting of hazardous occurrences encountered serious impediments at Mount Polley mine. A clear, effective and confidential line of communication for immediate recourse and access to expertise is not only essential to the systematic and effective implementation of the MPRP recommendations, but critical to avoiding another TSF breach.

Under the rule of law, mine employees should have no impediments or fear of repercussion, and should be immune to any backlash from the company or the Ministry for exercising their due diligence and calling the BC Environmental Emergency 1-800 number in situations where they identify an impending TSF breach, any associated concerns regarding a TSF, or any other potential environmental emergency.

While reporting occurrences to the TACs and/or the ITRB are necessary protocols, these administrative bodies are not emergency response teams. Therefore, in addition to our proposed new provision for workers to immediately report serious defects and potentially dangerous situations to the Ministry of the Environment and the Ministry of mines through the emergency 1-800 number, we also ask that both Ministries develop a coordinated emergency response plan. Evidence shows that local residents received no response from any government agency or official in the first 48 hours after the Mount Polley breach.

This new provision, and a clear emergency plan will boost worker confidence and morale, empowering them to apply full due diligence without fear of reprisal. This will also support MPRP recommendation #5 ("regulatory operations") and #7, by bolstering public confidence and "public safety" when workers spot situations contemplated under HSRC section 1.7.3(2) - "cracking or subsidence of a dam or impoundment dike ..." and other TSF-related occurrences requiring immediate response.

#### **New Section**

**1.7.4** *An employee or contractor who becomes aware of any potentially serious defect in a tailings impoundment dam or dike, or of a potential serious occurrence listed in section 1.7.3(2), shall immediately report the matter to the BC Environmental Emergency number, and shall also immediately notify the tailings advisory committee and the Independent Tailings Review Board, both of whose contact information must be readily available at all mine sites.*

*Health, Safety and Reclamation Code*

**PART 9**

**Exploration**

# Definitions

## Placer Minerals: Riparian Setbacks

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Placer mining exploration is minimally regulated in BC, which has led to environmental problems and social discord. We therefore propose the expansion of the definition of “exploration activity” in the “Definition” section of Part 9 to include “placer minerals” in order to bring placer mining activity within the regulatory scope of the Part 9 provisions, including Part 9’s statutory standards for riparian setbacks which we have proposed amending to a 30 metre minimum.

At present, Part 9 of the *HSRC* exempts placer mining from ordinary exploration requirements. Part 10, section 10.1.1 creates another issue with its separate requirements for placer mine plans. The exclusion of placer activities from Part 9 means it is also excluded from section 44 of the *Water Regulation*.<sup>1</sup> Section 44 allows changes in or about a stream if a miner complies with Part 9. Collectively, this means placer mining operates without riparian limits in BC law.

An audit<sup>2</sup> undertaken by Ministry of Environment staff in 2010 revealed a low adherence to mine plans among the majority of placer mine sites. Further, absent a clear legislative standard regarding riparian setbacks, many placer miners were well within the 10m setback that seems to have its origins in an uncertain interdepartmental memorandum. The lack of a clear legislative threshold for placer mining setbacks has instead been replaced by something more akin to a word of mouth practice among placer miners. This is causing damage – from mild to extreme – in a vast number of streams and rivers within BC’s extensive placer zones. It is a serious concern to rural residents, recreational users, hunters, trappers, outfitters, and First Nations who are directly impacted by this threat to, and loss of, precious waterways, and traditional economic resources and food sources.

The low adherence to an already loose riparian threshold has also caused inter-departmental friction as the Ministry of Forest Lands and Natural Resource Operations operates under a different setback regime. Foresters are finding their compliance to setbacks is simply being overrun and violated by placer operations.

We therefore present our recommendations for new riparian setbacks. In the alternative, we suggest enacting separate placer mining legislation in order to establish consistent, enforced standards for all placer mining activities, including clearly defined setbacks.

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<sup>1</sup> *Water Regulation*, BC Reg 204/88, s 44(3).

<sup>2</sup> The hardcopy version, or an electronic copy of the document is difficult to find, but is available online at: <<http://cariboominingassociation.com/2012/11/19/b-c-ministry-of-environment-does-clandestine-audit-of-cariboo-placer-miners/>>.

# Definitions

## Placer Minerals: Exploration Activities

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### Part 9

#### Definitions

##### Current

##### *“exploration activities”*

are those activities which are undertaken in the search for and development of coal and minerals, as defined in the Mineral Tenure Act, with the exception of placer minerals:

##### Amended

##### *“exploration activities”*

are those activities which are undertaken in the search for and development of coal and minerals, as defined in the Mineral Tenure Act, *including placer minerals*:

Related Legislation		
Statute	Section	
HSRC	10.1.1	Proposed Placer Mines
HSRC	<del>10.1.12</del>	Exceptions (strike from the HSRC)

# Definitions

## Airborne Geophysical Surveys

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We recommend amendments to the definition of “exploration activities” to include “airborne geophysical surveys” among those activities in Part 9, Definitions, subsection (a) requiring a Notice of Work, in order to account for the extremely stressful nature of such activity on wildlife, especially on ungulate species during sensitive seasons.

Over the last few years, First Nations and non-Aboriginal communities alike have consistently raised concerns to FMC that many mining companies undertaking airborne surveys pay little attention to sensitive wildlife seasons, causing additional stress on already impacted populations.

We therefore recommend a suspension of such activities during sensitive seasons. Further, we recommend the following statutory requirement for an exploration permit (Notice of Work) for airborne geophysical surveying during the non-sensitive times, along with strict adherence to a flight schedule. An exploration company can easily achieve an accurate determination of the sensitive times of the year by simply engaging with local First Nations communities, guide outfitters, NGOs, and wildlife officials.

### Part 9 Definitions

Current	Amended
<i>“exploration activities”</i>	
are those activities which are undertaken in the search for and development of coal and minerals, as defined in the Mineral Tenure Act, with the exception of placer minerals:	are those activities which are undertaken in the search for and development of coal and minerals, as defined in the Mineral Tenure Act, <i>including</i> placer minerals:
(a) and include	(a) and include
(i) disturbance of the ground by mechanical means such as drilling, trenching and excavating;	(i) disturbance of the ground by mechanical means such as drilling, trenching and excavating;
(ii) blasting;	(ii) blasting;
(iii) construction, modification, deactivation and reclamation of an exploration access and camps;	(iii) construction, modification, deactivation and reclamation of an exploration access and camps;
(iv) induced polarization surveys using exposed electrodes; and	(iv) induced polarization surveys using exposed electrodes;
(v) site reclamation.	(v) <i>airborne geophysical surveying</i> ; and
	(vi) site reclamation.

## 9.5.1 Table 9.1

### Riparian Setback Distances: Table 9.1

We propose amendments to the riparian setbacks in Table 9.1 of the *HSRC* in accordance with the *Northern Secwepemc te Qelmucw Mining Policy*, Appendix C, section 6, to reflect the minimum setback of 30 metres for “minimal exploration activities” and 70 metres for “disruptive exploration activities” for all riparian areas. Notably, the 30 metre setback is not unprecedented in BC law as it is also found in the definition of “riparian assessment area” in the *Riparian Areas Regulation*,<sup>1</sup> made under the *Fish Protection Act*.<sup>2</sup>

(For brevity, we present only the amended Table 9.1.  
Please refer to Part 9 of the *HSRC* for the current Table 9.1)

#### Amended

**RIPARIAN MANAGEMENT**  
**Table 9.1**  
**RIPARIAN SETBACK DISTANCES**  
(Measured horizontally from the top of bank)  
For all mining activities

Riparian Type	Part 9 -Definitions “Exploration Activities (b)”	Part 9 - Definitions “Exploration Activities (a)”
Streams >1m width		
Wetland >1 ha	70m	30m
Lakes >1ha		

Related Legislation		
Statute	Section	
<i>Water Act</i>	9	Changes in or about a stream
<i>Fish Protection Act</i>	12	Provincial directives on stream-side protection

<sup>1</sup> BC Reg 376/2004, s 1(a) defines a “riparian assessment area” for a stream as the 30 meter strip on both sides of the stream, measured from the high water mark.

<sup>2</sup> *Fish Protection Act*, SBC 1997, c 21.

## 9.5.1

### Riparian Setback Distances: Allowable Activities

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We also recommend removing the exemptions under section 9.5.1(2) (and by extension section 9.5.1(3) of the *HSRC*). In our view, the new setbacks and remaining allowable activities proposed under section 9.5.1(1) are adequate to allow for activities that are necessarily incidental to successful exploration.

#### Amended (portions struck)

- 9.5.1** (1) The following activities may be carried out within the setback distances noted in Table 9.1
- (a) construction, maintenance, deactivation and reclamation of stream crossings;
  - (b) access from water landings for the purpose of servicing exploration camps and equipment;
  - (c) access to set up and service water supply pumps and lines; and
  - (d) access to service drill sites.
- ~~(2) Exploration activities in addition to those in (1) may occur within the riparian setback distances noted in Table 9.1 when one or more of the following conditions apply~~
- ~~(a) no other practicable option exists;~~
  - ~~(b) risk to health and safety can be reduced; or~~
  - ~~(c) risk of adverse impact to the environment can be reduced.~~

Related Legislation		
Statute	Section	
<i>HSRC</i>	9.11.1	Drilling

#### Authority / Reference

*Mineral Industry Environmental Protection Regulations*, 1996, RRS c E-10.2 Reg 7, s 24(4).  
*Mines and Minerals Act*, CCSM c M162, s 96(1).  
*Northern Secwepemc te Qelmuw Mining Policy*, Appendix C, section 6.  
*Work Permit - Disruptive Mineral Exploration Activities*, O Reg 349/98, ss 3(1)(a) and (b).

## 9.11.1

### Drilling

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In order to preserve critical wetlands we recommend removal of the exemptions in section 9.11.1 of the *HSRC* which allowed drilling to take place in lakes, on frozen wetlands, or within riparian setbacks.

#### Amended (portions struck)

- 9.11.1 (1) Drill sites shall not be located
- (a) within a stream,
  - (b) within a lake unless a management plan has been approved by an inspector, or
  - (c) within a known wetland unless
    - (i) the exploration activity is conducted when the ground is frozen,
    - (ii) at the time that work is conducted there is no standing water at the drill site, or
    - (iii) a management plan has been approved by an inspector,
  - (d) within a riparian setback area as defined in Table 9.1,
    - (i) unless authorization has been obtained pursuant to the provisions of sections 9.5.1(2) and 9.5.1(3), and
    - (ii) management plans shall include provision for management of drilling discharge.

## 9.13.1(2)

### Backfilling Pits and Trenches

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Section 9.13.1 of the *HSRC* mandates the backfilling of pits and trenches but grants exemptions that focus only on stability and egress.

Abandoned trenches, however, present other serious hazards. They collect rain and runoff, turning into stagnant and potentially toxic pools, and may become inadvertent (and sometimes deliberate) repositories for all manner of refuse. The option to leave them open is also inconsistent with section 9.12.1(3) which mandates the backfilling of refuse pits upon closure of exploration camps for the season. Should not all small exploration pits be backfilled in the interests of protecting the public and the environment? Further, requiring a miner to place a fence of unspecified quality (9.13.1(2)(a)) unnecessarily puts the miner in a legally vulnerable position he or she otherwise would not be in were the trench or pit simply backfilled.

Conversely, in the Yukon, legal provisions clearly describe the backfill process required for excavation trenches. This process requires that trenches constructed with mechanized equipment be backfilled by first depositing any removed overburden and bedrock, and then replacing the vegetative mat that was removed to construct the trench. We recommend a similar solution.

#### Current

- 9.13.1** (2) Pits and trenches shall be backfilled and reclaimed prior to abandonment, unless
- (a) the sides of the pit or trench are sloped to a stable and safe angle as determined by a qualified person, or the pit or trench is fenced to prevent inadvertent access, and
  - (b) there is a means of egress.

#### Amended

- 9.13.1** (2) Pits and trenches shall be backfilled and reclaimed prior to abandonment, *by first depositing any removed overburden and bedrock, and then replacing the vegetative mat that was removed to construct the trench.*

Related Legislation		
Statute	Section	
<i>HSRC</i>	9.12.1(3)	Camps

#### Authority / Reference

*Mine Development and Closure*, O Reg 240/00, Schedule 1, ss 21(1),(2).  
*Quartz Mining Land Use Regulation*, Y O/C 2003/64, Schedule 1, s.7.

### 9.13.1(3)

#### Re-vegetation: Noxious Weed Control

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Re-vegetation is critical to successful reclamation. Noxious weeds threaten revegetation efforts by out-competing native vegetation, reducing biodiversity and degrading nearby agricultural areas. We therefore recommend the following amendment to section 9.13.1(3) to reduce the risks from noxious weeds.

#### Current

**9.13.1** (3) Appropriate measures shall be taken to minimize the establishment of noxious weeds and the erosion of exposed or disturbed soil.

#### Amended & New Subsections

**9.13.1** (3) Appropriate measures shall be taken to minimize the establishment of noxious weeds and the erosion of exposed or disturbed soil. *Such measures include, but are not limited to*

- (a) *promptly controlling noxious weeds when they threaten the success of any planned re-vegetation of the exploration site,*
- (b) *preventing noxious weeds from spreading to nearby areas,*
- (c) *controlling noxious weeds so they do not create fire hazards, and*
- (d) *controlling noxious weeds by in accordance with the Weed Control Act.*

Related Legislation		
Statute	Section	
HSRC	10.7.7	Re-vegetation
HSRC	10.7.8	Growth Medium

#### Authority / Reference

*California Surface Mining and Reclamation Act of 1975*, 2 Cal §3705(a)(2007).

Indian and Northern Affairs Canada, “Mine Site Reclamation Policy for Nunavut” (Ottawa: 2002) at 5. Saskatchewan, Mineral Exploration and Government Advisory Committee, *Mineral Exploration Guidelines for Saskatchewan* (Regina: Queen’s Printer Saskatchewan, 2005), at 55.

*Surface Mining Control and Reclamation Act*, USC tit 30 §1266(b)(6).

## 9.13.1(4)

### Re-vegetation: Prior Natural State

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HSRC section 9.13.1(4) requires the re-vegetation of exploration sites with “species appropriate for the site” and leaves the door open for a miner to choose what is or is not appropriate rather than clearly requiring restoration of the vegetation to its prior natural state.

Our experience with communities reveals some miners are conscious of the need to restore local native species, while many remain unaware, choosing to simply spread bags of grass seed commonly available in garden supply stores to quickly and cheaply meet reclamation requirements. However, this practice is rarely effective and results in non-native species being introduced that often compete with desired native species.

Note: This proposed amendment also duplicates some aspects of HSRC sections 10.7.7 and 10.7.8 which govern post-closure reclamation.

#### Current

**9.13.1** (4) Exploration sites shall be re-vegetated to a self-sustaining state with species appropriate for the site.

#### Amended & New Subsections

**9.13.1** (4) Exploration sites shall be re-vegetated to *their prior natural states, in accordance with a re-vegetation plan prepared by a registered professional biologist and approved by the chief inspector and other agencies under s. 10.3, in order to*

- (a) make use of local or regional species,*
- (b) restore the biological integration of the local habitat.*

(5) *Where First Nations seek to provide input, or where First Nations input is sought, First Nations’ traditional knowledge shall be used in the re-vegetation of all exploration sites.*

Related Legislation		
Statute	Section	
HSRC	10.7.7	Re-vegetation
HSRC	10.7.8	Growth Medium

#### Authority / Reference

*California Surface Mining and Reclamation Act of 1975*, 2 Cal §3705(a)(2007).

Indian and Northern Affairs Canada, “Mine Site Reclamation Policy for Nunavut” (Queen’s Printer, Ottawa, 2002) at 5.

Saskatchewan, “Mineral Exploration and Government Advisory Committee, Mineral Exploration Guidelines For Saskatchewan” (Regina: Queen’s Printer Saskatchewan, 2005), at 55.

*Surface Mining Control and Reclamation Act*, USC tit 30 §1266(b)(6).

*Health, Safety and Reclamation Code*

**PART 10**

**Reclamation and Closure**

# Definitions

## Closure

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The Mining Association of Canada's ("MAC") contextual usage of the terms "reclamation", "closure", and "decommissioning" in the "A Guide to the Management of Tailings Facilities, Second Edition, 2011" draws meaning from the International Commission on Large Dams ("ICOLD").

Therefore, we recommend clear definitions for the closure phases of a mine in accordance with the ICOLD definitions in Part 10 of the *HSRC* except for one: "decommissioning." FMC defines decommissioning as a complete absence of all future risk of failure and environmental harm by emptying or rendering inert the contents of a TSF.

### New Definitions

#### Part 10

##### Definitions

**"after-care"** means the last phase of closure required to verify that the closure measures taken are performed according to the design and expectations. After being verified, the "after care" phase ends and the "Long Term Monitoring" phase starts;

**"closure"** means the shutting down of a mine, including tailings storage facilities when production has permanently ceased, including the transition of the mining area and tailings storage facilities into long-term stable structures;

**"decommissioning"** means when the tailings storage facility no longer presents a risk of failure or risk to the environment, by either emptying or rendering inert its contents, and includes the closing down of all remediation and after care operations, and removal of unwanted structures;

**"long term monitoring"** means monitoring in perpetuity of the all mine site workings including tailings storage facilities;

**"remediation"** means the measures required during closure to secure the long term stability of the mine site including tailings storage facilities, and to ensure environmental safety of structures such as tailings dams and disturbed ground;

FMC has identified an issue regarding inferior exploration data that belongs in preliminary economic assessments (“PEA”s) being submitted in the permitting process as ‘bankable’. We have suggested an amendment here for consideration in the HSRC to help remedy this defect. However, as we have discussed in our Introduction, this is an example of where the HSRC provision cannot be amended without amending its governing provision (section 10) of the *Mines Act*. Therefore, we submit our amendment here for Part 10 and submit it in conjunction with our amendment to the *Mines Act* in the next section of this document.

We strongly recommend that no permit be granted if inferred resources are represented in any way as actual indicated or measured reserves. A global inventory of TSF failures shows that too many TSF breaches (including Mount Polley) are in part caused by a combination of factors associated with the demand for “higher mine production necessitated by lower grades of ore, [within] a century of declining prices offset by declining costs per ton”<sup>1</sup>

This results in “overly optimistic or highly aggressive assumptions in the PEA, or methodologies that diverge significantly from industry best practice guidelines and standards for exploration and mineral resources”<sup>2</sup> These assumptions are then relied on to put high volumes of much lower grade ores into full production in order to turn a profit. This leads to stressors on TSFs that were not, or are not, designed to receive such large loads, thereby resulting in failure and harm to the environment and downstream communities.

### New Section

**10.1.01** *Despite any provision of this Code, and in accordance with section 10(1)(0.1) of the Mines Act, no permit for a mine plan shall be issued for a mine based on any representation of mineral resources as mineral reserves, or by representing inferred mineral resources as “ore” or mineral reserves.*

<sup>1</sup> Lindsay Newland-Bowker, & David M Chambers, “The Risk, Public Liability & Economics of Tailings Storage Facility Failures”, at 1.

<sup>2</sup> Canadian Securities Administrators, CSA Staff Notice 43-307, Mining Technical Reports – Preliminary Economic Assessments, 16 August, 2012; online: <[https://www.osc.gov.on.ca/en/SecuritiesLaw\\_csa\\_20120816\\_43-307\\_mining-tech-rpts.htm](https://www.osc.gov.on.ca/en/SecuritiesLaw_csa_20120816_43-307_mining-tech-rpts.htm)>.

## 10.1.1(1)

### Background Check: Placer Mines, Gravel Pits & Quarries

Of all the criteria for approving mines in BC, it seems a passable (but sometimes flawed) NI 43-101 report and feasibility study, and the ability to raise enough capital regardless of the nature of the investment, override consideration of the mining company's reputation. The Mount Polley breach illuminates this long-standing problem.

Therefore, we propose a new section to account for a miner's past performance - in effect, a background check - in the HSRC provisions before a permit is granted. And we submit this amendment for inclusion in both section 10.1.1 and 10.1.2 to cover all mining activities.

Our proposed HSRC section 10.1.1(a) establishes a mandatory background check for all placer miners with automatic denial of an application for applicants with 2 or more violations in the last 3 years, or any 1 failure to comply with an order at any time. We offer the same for all other mines in our suggested amendment for section 10.1.2.

#### New Subsection

**10.1.1** *(1) In accordance with section 10 of the Mines Act, in considering a Notice of Work the chief inspector shall take into account the owner's past performance, if any, and may deny any application if the owner's record contains more than 2 permit violations in the last 3 years, or if the owner has failed to comply with 1 or more remedial orders, that have not been the subject of appeal, at any time for any exploration site, mine site, or reclamation site.*

Related Legislation		
Statute	Section	
<i>Mines Act</i>	10	Permits

#### Authority / Reference

30 USC 25 § 1260(c).

*Mining Regulations* 2010 (NSW), s 4(1).

Aligning with the Best Applicable Practice of “corporate responsibility” in MPRP recommendation #1; in keeping with consideration of the “social and economic aspects of the project” in MPRP recommendation #3; and in the interests of “public safety” in MPRP recommendation #7, we recommend enacting a requirement for a valid access and/or exploration agreement with First Nations communities. First Nations are usually the first to endure negative side-effects, and are most vulnerable to depletion or destruction of natural resources, cultural heritage sites, and food sources, especially in the event of a catastrophic failure. First Nations’ constitutionally protected rights and title also place them in a unique position, and, as rights-holders, they must be recognized.

Entering into agreements with local First Nations is increasingly considered standard business practice in BC’s mining sector, and is encouraged by many organisations.<sup>1</sup> It has been part of the province’s New Relationship endeavour since 2005. FMC has outlined many examples of this approach being adopted as law in other jurisdictions in *Fair Mining Practices: A New Mining Code for British Columbia*. In order to ensure consistency and transparency, we recommend this standard practice be given legal weight by incorporating it into a statutory provision as follows.

This is another joint *HSRC - Mines Act* amendment recommendation.

### New Subsection

**10.1.2** (4) *In accordance with section 10(1)(0.4) of the Mines Act no work shall proceed without an agreement in place with each affected First Nation.*

### Authority / Reference

*Chartrand v. British Columbia (Forests, Lands and Natural Resource Operations)*, 2015 BCCA 345 (This case expressly leaves First Nations’ claims to aboriginal rights and title open in addition to Treaty rights.) *Crown Minerals Act*, New Zealand 1991, s 80.

Inuvialuit Final Agreement, Indian and Northern Affairs Canada, Ottawa, 1984, s10(2).

*Minerals Act*, Norway, c 4, s 17.

*Native Title Act 1993*, Australia, s 31(1).

*Platinex Inc. v. Kitchenuhmaykoosib Inninuwug First Nation*, 2007 CanLII 20790 (ON SC).

<sup>1</sup> The Association of Mineral Exploration BC, the Canadian Institute of Mining and Metallurgy, the Mining Association of BC, the Mining Association of Canada, the Prospectors and Developers Association of Canada, and the federal Ministry of Natural Resources.

Our proposed new HSRC section 10.1.2(4) incorporates six of the MPRP’s seven recommendations.

Checking a proponent’s history will invoke the BAT criteria in recommendation #1 for permit applications for all stages of tailings impoundments and ask, where applicable, “Has the proponent used all Best Available Technology in the past?” As part of recommendation #7’s interest in public safety it will also ask “Has the proponent made accurate downstream risk assessments and failure classifications or was there an effort to downplay the real failure potential for insurance savings, or some other misinformed reason?”

The background check also invokes recommendation #2: the MAC standards in the Audit and Assessment functions, and the corporate design commitments of MPRP recommendation #3. A proponent’s record of compliance with NI 43-101 standards and other markers, such as the number of securities and exchange commission violations, will also be considered.

If the application includes work on a TSF, this will trigger the involvement of the Independent Tailings Review Board called for by the MPRP in recommendation #4 (enhanced by our recommendations to act as a single provincial body).

**New Subsection**

**10.1.2** (5) *In accordance with section 10(1)(0.4) of the Mines Act, in considering a Notice of Work the chief inspector shall take into account the applicant’s past performance, if any, and may deny any application if the proponent’s record contains more than 2 permit violations in the last 3 years, or if the proponent has failed to comply with 1 or more remedial orders at any time.*

Related Legislation		
Statute	Section	
Mines Act	10	Permits
Mines Act	33	Appeal
HSRC	10.1.2	Proposed Coal and Mineral Mines ...

**Authority / Reference**

- 30 USC 25 § 1260(c).
- Kaska Mining Regulation, OIC 2004/24, s 6.
- Mining Regulations 2010 (NSW), s 4(1).
- S Dak CL c 45 § 6B-22.
- Quartz Mining Act, SY 2003, c 14, s 139(2).

The HSRC requires that certain baseline information be included in the mine permit application. MAC Guidelines contain broader, and better defined baseline information requirements. We suggest incorporating the following MAC guidelines for scientific data and studies into section 10.1.4. Special attention should be given to the “Socio-economic historical background”.

Mining Association of Canada Environmental and Scientific Data and Studies	
Climate	temperature, wind, precipitation, evaporation, air quality, climate change
Water	hydrology, watershed delineation and flow patterns, stream flow, run-off, floods, lake bathymetry, hydrogeology characteristics, and water and sediment quality
Land forms	including muskeg, peat or talus slopes
Unique geographic considerations	such as permafrost and ice
Existing infrastructure	including roads, buildings, open pits and waste dumps
Geology and geochemistry	surficial deposits (type, location, density, permeability, soils characterization), stratigraphy, geomorphology, seismicity, mineral resources, background elemental content
Topography	regional and detailed topography
Natural hazards	landslides, debris flows, avalanches, seismic events, frost
Terrestrial survey	flora, natural pastures, fauna, endangered and threatened species, migratory species
Aquatic survey	benthos, macro-invertebrates, fish, aquatic plants, endangered and threatened species
Socio-economic	historical background

The information currently required in a mine permit application is often insufficient for the government to make an informed decision about the potential social, cultural, economic, and environmental consequences of the proposed mine.

For example, under current law, proponents must include details regarding the present use and condition of the land and watercourses in the mine permit application. However, there is no specified length of time over which data must be collected. As such, there is no assurance that the baseline studies are performed over a sufficiently long time to accurately establish baseline (pre-mining) conditions.

Therefore, we have proposed adding new sections 10.1.4(1.1)(1.2) and (1.3) requiring adequate historical baseline data collected over an established time period and we recommend inserting these new provisions under section 10.1.4(2). These provisions help ensure that a complete and accurate understanding of all historical social, economic, and environmental conditions is established before mining plans and operations are reviewed. This will aid the TAC and the Ministry in evaluating the actual risks and potential costs to the users and environment downstream from a mine, and particularly downstream of a TSF.

While it touches all aspects of the pre-permitting considerations for TSFs, this new provision is especially important in fulfilling MPRP recommendation's #3 call for the consideration of all "technical, environmental, social and economic aspects of the project".

In keeping with the recognition of First Nations as rights-holders, we have recommended this baseline information be obtained in partnership with local First Nations.

**New Subsections**

- 10.1.4 (1.1) *Historical data to conclusively show*
  - (a) *a complete seismotectonic profile,*
  - (b) *groundwater and surface water profile,*
  - (c) *land use productivity and yields,*
  - (d) *fibre and wood production,*
  - (e) *local food dependency in consultation with local communities, and*
  - (f) *any and all other historical data of value to a permit application as may be required by the chief inspector.*
- (1.2) *The historical data in (1.1) must be collected from a sufficient number of sources and over a sufficient length of time to obtain a complete historical characterization.*
- (1.3) *Data in 1.1 shall be obtained in partnership with local First Nations.*

**Authority / Reference**

Mont Code § 82-4-335(5)(k) (2011).  
W Va Code § 22-3-10(a)(2)(C) (2011).

## 10.1.4(2)(c)

### Seismotectonic & Hydrogeological Data

### TERMS of REFERENCE



As discussed in the Introduction, the MPRP report recommendation #6 warrants the inclusion of precise hydrogeological and seismotectonic data for “improved site characterization”. We recommend amendments to section 10.1.4 of the *HSRC* to help compel a higher standard from geologists.

Incorporating this standard into legislation affects all MPRP recommendations since hydrogeological and seismotectonic data will find its way into BAT and BAP. It aligns with the MAC Guidelines, CDA Guidelines, and bolsters bankable feasibility studies. It will become criteria in the regulatory regime and current inventory inspections, and will be a part of the ITRB review criteria for TSF applications.

#### Current

**10.1.4(2)** The [permit] application shall include  
 (c) general geology and detailed geological descriptions of the deposit.

#### Amended Subsection

**10.1.4(2)** The [permit] application shall include  
 (c) general geology and detailed geological descriptions *including detailed hydrogeological and seismotectonic data of the deposit, mine site, proposed pit and tailings storage areas, and surrounding area 500 metres from the outermost edge of all tailings storage facilities.*

Related Legislation		
Statute	Section	
<i>Mines Act</i>	10	Permits
<i>Mineral Tenure Act Regulation</i>	Schedule A 8(8)	Specifications for Geophysical Surveying
Application Requirements for a Permit Approving the Mine Plan and Reclamation Program Pursuant to the <i>Mines Act</i> ,	Appendix 1, s. 2.2.2	

Socio-economic considerations are detailed in the Ministry policy document “Application Requirements for a Permit Approving the Mine Plan and Reclamation Program Pursuant to the *Mines Act*”, Appendix 6, but are not mandated in BC mining law. In the spirit of the MPRP report which details the ineffectiveness of simply ‘encouraging’ miners, we propose adding new subsection 10.1.4(2.1) to capture the requirement for a local economic plan as part of a mining permit application.

This supports MPRP recommendation #3 by detailing the “social and economic aspects of the project” and improving the cost/benefit analysis and feasibility study by securing local support for the project.

### New Section

10.1.4(2.1) *The [permit] application shall include a proposal for the employment and training of local citizens and promoting local business development, including a specific proposal for employment, training and retaining of local First Nations members and businesses.*

### Authority / Reference

*Mines and Minerals Development Act*, (No 7 of 2008) Zambia, s 25(3)(g)(h).  
*Mines and Minerals Act* (No 12 of 2009) Sierra Leone, s 138.

## 10.1.4(3)(c)

### Best Available Technology Requirement in the Mine Plan

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To clearly incorporate the MPRP recommendations for the use of BAT, we recommend amendments to section 10.1.4(3) of the *HSRC* to include clear language. Please refer to Table 1.2 in the Appendix of this document for some associated BAT suggestions.

Current	Amended Subsection
10.1.4(3) (c) descriptions of mining methods, mining rates, projected mine life, processing methods and infrastructure requirements,	10.1.4(3) (c) descriptions of mining methods, mining rates, projected mine life, processing methods and infrastructure requirements, <i>in accordance with the Best Available Technology requirements set out in this code,</i>

## 10.1.4(3)(g)(l)(m)(n)

The following proposed amendments directly support MPRP recommendations #1, #2, #3, and #7 and the call for BAP and BAT in all TSFs for the “detailed evaluation of all potential failure modes and a management scheme for all residual risk”, and the adoption of the 2014 CDA Guidelines. We recommend an amendment to section 10.1.4 (g) of the *HSRC* to align with Part 2 of the *Environmental Management Act*, and 3 new sections after 10.1.4(3)(k) to help address one of the main planning flaws which led to the Mount Polley breach according to the MPRP - namely, the raising of the TSF dam. The raising of the TSF dam was “[m]ore reactive than anticipatory” and done “incrementally, one year at a time, driven by impoundment storage requirements for only the next year ahead”.<sup>1</sup> We believe our amendment would capture stresses on TSFs such as unplanned increases in production, and water balance and waste disposal issues.

### Current

**10.1.4** The application shall include the following  
(3) a mine plan including ...  
(g) designs for material handling and waste disposal procedures,

### Amended & New Subsections

**10.1.4** The application shall include the following  
(3) a mine plan including ...  
(g) designs for material handling and waste disposal procedures, *in accordance with Part 2 of the Environmental Management Act*,  
...  
(l) *complete and detailed plans in accordance with Best Applicable Practices and Best Available Technology for securing increased tailings storage capacity against an planned or sudden increases in production,*  
(m) *alternative water use plans for planned or unplanned production increases,*  
(n) *a detailed plan for water recovery a de-watering of tailings which meets the standards of Best Available Technology in this code,*

Related Legislation		
Statute	Section	
<i>Environmental Management Act</i>	6	Waste Disposal

<sup>1</sup> “Report on Mount Polley Tailing Storage Facility Breach”, Independent Expert Engineering Investigation and Review Panel (Government of British Columbia, Queen’s Printer, 30 January, 2015) at 75.

To fulfil MPRP recommendations #2 and #3, we recommend the adoption of a statutory requirement for field-verified metrics as the first measure in any conceptual mine design and plan. The practical application of mine plans often changes between the drawing room and the operating site, sometimes resulting in serious, irrevocable costs because of the predominant reliance on computer models and corresponding assumptions without adequate field verification.

From its inception, “[t]he mine plan should be used to identify the nature, location, and extent of contamination sources at the mine. Natural sources of metals and other mine-related constituents may also exist and should be identified. In addition to acid-generation potential, sources should be examined for the potential to leach metals and any other constituents of concern identified in the source materials. The location and size/volume of the sources need to be estimated for the conceptual model, and much of this information will be available in the mine plan.”<sup>1</sup> Knowing the site is knowing the plan, and vice versa, which gives better control over outcomes.

A Best Applicable Practice that would assist the engineer(s), the proponent, and the ministries in this regard used to be found in section 26.1(4) of the *Waste Management Act* (repealed), which previously required a site profile for any and all issuances and amendments to permits under section 10 of the *Mines Act*. We recommend that this requirement be reinstated, and that it be placed within section 10 of the *Mines Act* and section 40 of the *Environmental Management Act*. However, in lieu of this, we have included the detailed provisions under a new recommended subsection (o) in 10.1.4(3) of the *HSRC*.

Field-verifiable metrics based on critical site knowledge and augmented by mandatory site profiles also help to fulfil MPRP recommendation #1(b) for choosing the Best Available Technology for new TSFs, and augmenting the CDA Guidelines with a made-in-BC solution. Notably, the MAC also echoes the need for the “continual improvement in the management of health, safety and environmental risks associated with tailings facilities, to be applied from site selection and design, through construction and operation, to eventual decommissioning and closure”<sup>2</sup> [emphasis added].

### New Subsection

- 10.1.4(3)** (o) *a site profile that delineates the nature, location, volume and extent of all contamination sources, including natural sources of metals and other mine-related constituents, and sources of potential acid generation.*

NOTE: Section 10.1.4 (4) (c) has 3 subsections - the first 2 are numbered with lower-case Roman numeral (i) and the 3rd is numbered as (ii).

1 A.S. Maest, J.R. Kuipers, C.L. Travers, and D.A. Atkins, “Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties, and State-of-the-Art” (Kuipers & Associates, Buka Environmental, Boulder, 2005) at 6.

2 “Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities, 2011” (Mining Association of Canada, 2011, Ottawa) at iii.

## Proof of Economic Feasibility

2

3

In accordance with MPRP recommendations #2 and #3 we propose a mandatory requirement for proof of a closure plan's perpetual feasibility. The financial instruments must be secured in trust and a clear transition plan must be in place that will ensure the responsibility for long term care and maintenance is secured through a line of capable, experienced parties with adequate knowledge and expertise, to continue with the perpetual maintenance plan using the latest BAT and BAP.

A provable plan meets MPRP recommendation #2 by contributing to good corporate governance, and meets recommendation #3 by securing the highest standard of feasibility and the real, overall cost/benefit of all tailings and closure options.

## Current

- 10.1.4** (7) a conceptual final reclamation plan for the closure or abandonment of all aspects of the mining operation, including
- (a) plans for long term post-closure maintenance of facilities,
  - (b) proposed use and capability objectives for the land and watercourses,

## New Subsections

- 10.1.4** (c) *proof that the long term closure plan is economically feasible in perpetuity, and*
- (d) *proof that the owner, agent, or manager has operated successfully in conditions similar to those in British Columbia for at least 10 years without causing degradation actionable under any administrative proceeding, civil action, criminal action, or other legal proceeding.*

## Authority / Reference

A. Warhurst and L. Noronha, "Environmental Policy in Mining: Corporate Strategy and Planning for Closure", (Washington DC: CRC Press LLC, 2000) at 189.  
1997 Wisconsin Act 171 s 293.50 1, 2.

## 10.1.4(8)

### Worst-Case Scenario Estimate

2

3

We propose the following amendment to section 10.1.4(8) of the *HSRC* to establish a requirement for a separate costs estimate for a worst-case scenario TSF breach, which will also require a separate security amount. This amendment is meant to work in conjunction with our proposed addition of section 10(4.3) to the *Mines Act* (Emergency Amounts).

#### Current

**10.1.4** (8) an estimate of the total expected costs of outstanding reclamation obligations over the planned life of the mine, including the costs of long term monitoring and maintenance

#### Amended & New Subsection

**10.1.4** (8) an estimate of the total expected costs of outstanding reclamation obligations over the planned life of the mine, including the costs of long term monitoring and maintenance *under normal operations*.  
(a) *The cost estimate shall also contain a separate estimate for a worst-case tailings storage facility breach scenario in accordance with section 10(4.3) of the Mines Act.*

Related Legislation		
Statute	Section	
<i>Mines Act</i>	10(4.3)	New: Permits - Emergency Amounts

## BAT Requirements in Design Standards for Major Impoundments

1

3

7

We support MPRP recommendation #1(b) but differ in the choice of language in one fundamental regard. The statement: “BAT should be actively encouraged for new tailings facilities at existing and proposed mines” does not lend itself to enforceable statutory language, which we submit is essential. Our submission aims to provide clear statutory language mandating the adoption of recommendations and guidelines. This approach is supported by the MPRP in its analysis of the CDA Guidelines:

“Mount Polley illustrates that dam safety guidelines intended to be protective of public safety, environmental and cultural values cannot presume that the designer will act correctly in every case. To do so defeats the purpose of FS [Factor of Safety] criteria as a safety net. In this, the CDA Guidelines are unable to achieve their intended purpose. Neither is the Province well served, to the extent that MEM has incorporated compliance with these guidelines as a statutory requirement.”<sup>1</sup> [emphasis added]

Section 10.1.5 of the *HSRC* provides another opportunity to clearly mandate the use of BAT. We have added subsections (1) and (2) to 10.1.5 to reflect BAT in design standards. Not only should major impoundments abide by the latest CDA Guidelines, but the construction and design methods should take into account the composition of the tailings and the production methods. Both of these features work in conjunction and greatly affect the ability of a TSF to perform its designated tasks effectively and in perpetuity, if needed. Tables 1.2.1 and 1.2.2 in the Appendix provide detailed lists of the different tailings compositions and processes that affect TSF stability.

<b>Current</b>	<b>Amended &amp; New Subsections</b>
<p><b>10.1.5</b> Major impoundments, water management facilities and dams shall be designed in accordance with the criteria provided in the Canadian Dam Association, Dam Safety Guidelines.</p>	<p><b>10.1.5</b> <i>Except where better available technology and practices are available, all major impoundments, water management facilities and dams shall be designed in accordance with the criteria provided in the Canadian Dam Association, Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams.</i></p> <p><i>(1) All tailings storage facilities shall also take into account the composition and processing characteristics of tailings outlined in this code.</i></p> <p><i>(2) All tailings storage facility plans shall include dam failure consequence classification analysis in accordance with s. 10.6.8.</i></p>

<sup>1</sup> “Report on Mount Polley Tailing Storage Facility Breach”, Independent Expert Engineering Investigation and Review Panel (Government of British Columbia, Queen’s Printer, 30 January, 2015) at 133.

BC law has provisions for environmental emergencies under section 87 of the *Environmental Management Act*, but in the case of Mount Polley, it was not the preferred legislative response. Instead, a pollution abatement order was issued under section 83 of the *Environmental Management Act* the day after the breach.<sup>1</sup> FMC recommends taking *preventative* measures against a natural disaster such a major seismic event that could cause sudden catastrophic TSF breach. In BC, seismic analyses are at the discretion of the engineer, while other jurisdictions require catastrophic event analyses even if the probability of occurrence is low.<sup>2</sup> Although the Canadian Dam Safety Bulletin 2014<sup>3</sup> begins to classify an Annual Earthquake Exceedance Probability (“AEP”) of 2,500 years at dam safety target level “High”, we believe a 2,500 year AEP, as used in other jurisdictions,<sup>4</sup> should be the minimum “Low” threshold - especially as BC is a province with an active seismic and volcanic history.

#### New Subsections

- 10.1.8** (1) *Tailings storage facility designs must include an analysis of catastrophic consequences even if the probability of occurrence is low, and*
- (a) *the analysis must be supported by credible scientific evidence;*
  - (b) *the analysis must include contingency plans for unpredicted negative impacts; and*
  - (c) *the analysis must contain alternate access routes to potential failure locations.*
- (2) *Calculations regarding the structural and foundation seismic stability of a dam must be done on the basis of a minimum low threshold return period of 2,500 years.*
- (3) *All tailings impoundments must be built to a minimum operational safety factor of 2.0.*
- (4) *The upstream method or modified-upstream method of design for new mine facilities shall be avoided where possible in the design of tailings storage facilities.*

<sup>1</sup> File 107461, 5 August 2014: Online: <[http://www.env.gov.bc.ca/eemp/incidents/2014/pdf/PollutionAbatementOrder\\_20140805.pdf](http://www.env.gov.bc.ca/eemp/incidents/2014/pdf/PollutionAbatementOrder_20140805.pdf)>.

<sup>2</sup> O Rev Stat § 517.979(3)(a) (2011); *Environmental Protection and Enhancement Act*, RSA 2000, c E-12, s 49(j).

<sup>3</sup> Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams, 2014, (Canadian Dam Association, 2014), Table 3-3, p 26.

<sup>4</sup> RRQ Dam Safety Regulation, c S 3.1.01 r 1, Div II §2 s 29.

In our view, all plans, including reclamation and closure plans should involve engagement with communities of interest, and with First Nations. Therefore, we propose adding subsection (5) to HSRC 10.1.10 to ensure that engagement with all affected parties has occurred, and that the costs of such engagement are paid in full by the miner.

This directly relates to MPRP recommendations #2, #3, and #7 - mandating the best corporate governance practice - by addressing local social and economic needs in the interest of public accountability and, ultimately, public security and safety.

Current	New Subsections
<p><b>10.1.10</b> The mine plan and reclamation program required under sections 10.1.1, 10.1.2 and 10.6 of this code shall</p>	<p><b>10.1.10</b> (5) contain confirmation by the chief inspector that</p> <ul style="list-style-type: none"><li>(a) the Crown has discharged its duty to consult with affected First Nations</li><li>(b) engagement has occurred with other local communities in accordance with this code and the Act,</li><li>(c) engagement has occurred with all other relevant ministries and agencies, and</li><li>(d) the proponent has paid the cost of the engagement and the application process at the time of the decision.</li></ul>

**90 Days Response Time for First Nations**

First Nations' support can be a crucial element to the success of mining in all its phases: preliminary exploration, full exploration, development, closure, and post-closure. Yet the current regime establishes a 30-day response time for Notice of Work applications, which we have noted in our work with First Nations is problematic for several reasons:

1. The response time begins counting down from the date the letter was written. We have seen cases where letters were sent and received using Canada Post rural delivery, spending 8-10 days in transit.
2. The Ministry receives referrals (Notice of Works) weeks prior to sending them to First Nations. While the delay in forwarding to First Nations is clearly necessary for the Ministry to perform due diligence, it would be a much easier process for miners and First Nations resource personnel to begin communicating with one another at the outset.
3. Referrals come in a standard format but each contains a cover letter written by a different advisor for each region. Some are very helpful, alerting First Nations to things such as archaeological or heritage sites they need to be aware of, while others are less helpful. A more consistent and helpful approach across all regions would serve all parties well and help mitigate difficulties in an already difficult process.
4. Referrals are created and utilized in an environment with multiple levels of support staff. First Nations often have a much smaller staff handling all resource referrals, not just mining referrals. The flaws in the process we have indicated are exacerbated in administrations not equipped to handle the demand. This situation also creates tension between First Nations and the Ministry, and foments tension within First Nations communities who feel unheard and left out of the decision-making process. In turn this can result in a lack of local support with corresponding delays and increased costs and possible legal actions.

Therefore, we propose a requirement that the chief inspector grant a 90-day period to allow affected First Nations to perform adequate assessments and submit written responses. This time frame could be increased to 120 days in some situations.

**New Subsection**

- 10.2.3** (1) *Where a notice of filing has been published under section 10.2.1 of this code, a First Nation affected by, or interested in, the application and that wishes to make a cultural heritage assessment, social and economic impact assessment, or any other assessment in relation to the application that is deemed by that First Nation to be of value, has 90 days after the date on which the last notice was published to view the application and make representations to the chief inspector.*
- (2) *For large scale, complex projects or projects in highly sensitive cultural areas as defined by the affected First Nation the allowable response time in (1) is increased to 120 days.*

# 10.3.1

## Mandatory Referral

We recommend removing the chief inspector’s discretion to obtain input from an advisory committee in section 10.3.1 of the *HSRC*. We are of the opinion since the Mount Polley breach that an objective analysis by experts will unburden the office of the chief inspector from making critical decisions concerning TSFs. In sections 10.3.2 and 10.3.3 we also recommend making it mandatory to circulate and confirm responses for applications put forward by the chief inspector to other agencies and departments. We have drafted new section 10.3.4 for the purpose of forming a special TAC and submitted a recommendation for amending section 9 of the *Mines Act* to empower its formation, as discussed later in this submission.

### Current

**10.3.1** The chief inspector may refer to the advisory committee or the regional advisory committee established pursuant to section 9 of the *Mines Act*, applications submitted under section 10.1.2 of this code and may, where he deems it to be appropriate, refer any Notice of Work submitted under section 10.1.1 of this code.

### Amended

**10.3.1** The chief inspector *shall* refer to the advisory committee or the regional advisory committee established pursuant to section 9 of the *Mines Act*, applications and any Notice of Work submitted under sections 10.1.1 and 10.1.2 of this code.

Related Legislation		
Statute	Section	
<i>Mines Act</i>	9	Advisory Committee

## Positive Confirmation From Advisory Committee

5

In section 10.3.2 of the *HSRC* we recommend removing interpreting no response from the advisory committee as tacit approval, and instead imposing a positive obligation on the chief inspector to seek confirmation from the advisory committee that there are, in fact, no concerns with the application.

This amendment helps fulfil the MPRP recommendation to “strengthen current regulatory operations”.

## Current

**10.3.2** The advisory committee or regional advisory committee shall review every application referred to them and make recommendations to the chief inspector within 60 days following application. Where no response has been received within 60 days, the chief inspector will deem that there are no concerns.

## Amended &amp; New Subsection

**10.3.2** The advisory committee or regional advisory committee shall review every application referred to them and make recommendations to the chief inspector within 60 days following application. ~~Where no response has been received within 60 days, the chief inspector will deem that there are no concerns.~~

*(1) If the advisory committee has no concerns, it shall inform the chief inspector before expiry of the 60-day period. If the chief inspector does not receive a response from the advisory committee within the 60-day period, he or she shall seek confirmation from the advisory committee that there are no concerns before issuing any decision on the subject application.*

For the circulation of an application to other ministries, we recommend placing a positive obligation on the chief inspector where other ministries may be affected. This is of special importance with the Ministry of Forests, Lands and Natural Resource Operations. As such, we recommend replacing the language of tacit approval with a requirement to seek confirmation from the affected ministries. The importance of notifying other affected agencies is recognized in many other jurisdictions, (such as Oregon, Alberta, and New Brunswick) where the ministers responsible for the environment and agriculture must each approve mine permits.

**Current**

**10.3.3** Where a permit application under section 10.1.1 of this code is not referred to a committee for review under section 10.3.1 of this code, an inspector may circulate it to other ministries and agencies and they will have 30 days following referral to make written representations to the inspector. Where no response has been received within 30 days, the inspector will deem that there are no concerns.

**Amended**

**10.3.3** An inspector *shall* circulate a permit application under section 10.1.1 of this code to other affected ministries and agencies who will have 30 days following receipt of the referral to make written representations to the inspector. Where no response has been received within 30 days, the inspector will *seek confirmation from such other affected ministries and agencies that they have no concerns regarding the subject application before issuing any decisions.*

**Authority / Reference**

*Colorado Mined Land Reclamation Act*, Colo Rev Stat tit 34 art 32 §106(2).  
*Colorado Mined Land Reclamation Act*, Colo Rev Stat tit 34 §32-116(7)(j)(2011).  
 Idaho Stat tit 47 § 1507(d)(2012).  
 Idaho Stat tit 47 § 1507(7)(2012).  
*Metallic and Industrial Minerals Exploration Regulation*, Alta Reg 213/1998, s 37(2).  
*Mine Development Closure*, O Reg 240/00, s 12(2)(e).  
*Mining Act*, RSO 1990, c M 14, s 139.2(4.1).  
*Mining Act*, RSQ c M-13.1, s 232.5.  
*Mining Act*, SNB 1985, c M-14.1, s 68(2).  
 Or Rev Stat vol 12 c 517 § 915(2)(2011).  
 Or Rev Stat § 517.982(2)(2011).  
 S Dak CL c 45 §6B-11.  
 Wash Rev Code tit 78 §44.091(2011).  
 Wyo Stat tit 35 § 11-109(a)(ii).

To fulfil the MPRP recommendations listed in this section, and to augment the function of the Independent Tailings Review Board, we propose adding a new section 10.3.4 to the HSRC, for a new Tailings Advisory Committee to review and render advice specifically on those portions of applications involving a TSF.

**New Section & Subsections**

- 10.3.4** *Where an application submitted under section 10.1.2 of this code or a Notice of Work submitted under section 10.1.1 of this code concerns a tailings storage facility, or any work to be carried out on or about a tailings storage facility, the chief inspector shall refer the application or Notice of Work to the tailings advisory committee established pursuant to section 9.1 of the Mines Act.*
- (1) Portions of each application pertaining to tailings storage facilities shall be separately reviewed according to section 9.1 of the Mines Act.*
- (2) The tailings advisory committee shall be comprised of 3 members with expertise in TSF technology, with no connection to the proponent, the Ministry, or the agency, except by way of assessment of the application.*
- (3) The tailings advisory committee shall review each application in accordance with the Act, this code, and the Best Available Technology and Best Applicable Practices herein, and shall do one of the following:*
- (a) accept the TSF application,*
  - (b) deny the TSF application with reasons, or*
  - (c) return the TSF portion of the application to the applicant with conditions necessary for approval.*

Related Legislation		
Statute	Section	
<i>Mines Act</i>	1	Definitions – new: “Tailings Advisory Committee”
<i>Mines Act</i>	9.1	New – Tailings Advisory Committee
<i>HSRC</i>	10.1.5 - 10.1.9	Design Standards
<i>HSRC</i>	10.1.10	Plans and Programs
<i>HSRC</i>	10.1.11	Departure From Approval

## 10.4.1(4)

### Best Applicable Practices and Best Available Technology Requirements

#### TERMS of REFERENCE



We propose adding a new subsection (4) to section 10.4.1 of the *HSRC* under “Permit” to assist in the fulfilment of the MPRP recommendations (#1)(b) and (c) by mandating the adoption and inclusion of BAP and BAT principles prior to the issuance of permits. This also fulfils recommendation #2 by aligning with the MAC protocols, and MPRP recommendation #3(a),(b) and (c) by the usage of the MPRP’s recommended corporate design commitments. This will also fulfil MPRP recommendation #4 through the enhanced “validation of safety and regulation” (at the permitting phase) and serve investors by lending a new level of certainty to feasibility studies.

Notably, there are no MPRP recommendations this amendment does not touch, since these permit benchmarks are the same ones that will be used to assess the current TSF inventory under recommendation #5, incorporate the best geological assessments under new standards from the Association of Professional Engineers and Geoscientists of British Columbia (“APEGBC”) in recommendation #6, and dovetail with the latest, improved CDA standards 2014<sup>1</sup> under recommendation #7. Ensuring the absolute highest standards in TSF design and construction at this phase is the crux of creating a global standard of practice that will span all BC mining in perpetuity.

#### Current

**10.4.1** A permit issued under section 10(1) of the Mines Act shall take into consideration ...

#### New Subsection

**10.4.1** (4) *Best Applicable Practices and Best Available Technology requirements established by this code and any other recommendations made by the tailings advisory committee concerning the application.*

Related Legislation		
Statute	Section	
<i>Mines Act</i>	10	Permits

<sup>1</sup> Technical Bulletin: “Application of Dam Safety Guidelines to Mining Dams, 2014”, (Canadian Dam Association, 2014) at 5.

**Impoundments**

We recommend adding a new requirement to section 10.5.3 of the *HSRC* for the manager to submit the annual dam safety report to the ITRB, the chief inspector, First Nations, any community of interest, as well as making them publicly available online. This will increase transparency in a new commitment to Best Applicable Practices, improve corporate governance and design commitments, help the provincial TSF inventory assessment process, and improve engagement with communities and First Nations.

<b>Current</b>	<b>Amended</b>
<p><b>10.5.3</b> The manager shall submit an annual dam safety inspection report prepared by a professional engineer on the operation, maintenance and surveillance of the tailings and water management facilities and associated dams to the chief inspector.</p>	<p><b>10.5.3</b> The manager shall submit an annual dam safety inspection report prepared by a professional engineer on the operation, maintenance and surveillance of the tailings and water management facilities and associated dams to the chief inspector, <i>the Independent Tailings Review Board, communities of interest, and First Nations. Such report shall be made publicly available on the Ministry’s website within 30 days of being finalised.</i></p>

**10.5.12** Correction

**Excavations Near Property Boundaries**

We offer a correction to the typographical error in section 10.5.12 of the *HSRC*:

<b>Current</b>	<b>Amended</b>
<p><b>10.5.12</b> The owners of adjoining properties may, be agreement in writing, waive the provisions of sections 10.5.8,10.5.9 and 10.5.11.</p>	<p><b>10.5.12</b> The owners of adjoining properties may, <i>by</i> agreement in writing, waive the provisions of sections 10.5.8, 10.5.9 and 10.5.11.</p>

The 7-day minimum notice in section 10.6.1 is the only notice a miner must give before stopping work. The only requirements within the stoppage period, which can last up to a 1-year post-cessation of operations, are to carry out the conditions of the permit and continue with maintenance and monitoring under section 10.6.2(1)(a) & (b) of the *HSRC*. If a stoppage of more than 1-year is forthcoming, the miner must apply for an amendment to the permit (with conditions) under section 10.6.2(2).

If a mine goes from a suspension of operations to full closure, the notice period is a minimum 90-days under section 10.6.3 and requires a plan view of the mine showing most of its workings and “any other plans” if requested by the chief inspector in his/her sole discretion.

The progression from section 10.6.1 to 10.6.3 raises some issues. First, the 7-day notice under section 10.6.1 is extremely abrupt considering the effect a closure has on mine employees and the local economy. Second, section 10.6.2 contemplates a continuance of monitoring and maintenance that may or may not include the continuance of a thorough maintenance and monitoring regime specifically around TSFs (assuming one was in place beforehand). The Mount Polley case highlights the increase in risk to a TSF during downtime. Therefore, FMC recommends adding a specific provision to ensure thorough TSF maintenance and monitoring continues unaffected, dam safety reviews continue, and subsequent recommendations made by the engineer of record and approved by the ITRB are fulfilled, regardless of the level of operations, until the mine is closed. Further, section 10.6.3 is largely administrative in nature. When factoring in how the *HSRC* continues with closure under the remainder of 10.6 and later in 10.7, and the provisions therein that are subject to review, a good place to place the recommendation for clear and detailed plans at the outset of any work stoppage and potential shut-down, is section 10.6.

As such, we recommend the following amendments for sections 10.6.1, 10.6.2, and 10.6.3:

<b>Current</b>	<b>Amended &amp; New Subsection</b>
<p><b>10.6.1</b> The owner, agent, or manager shall provide written notice of not less than 7 days to an inspector of intention to stop work in, on, or about a mine.</p>	<p><b>10.6.1</b> The owner, agent, or manager shall provide written notice of not less than 14 days to an inspector, <i>communities of interest, and local First Nations</i> of intention to stop work in, on, or about a mine, <i>or if the mine decreases production to less than 60% of planned capacity as stated in the mine permit,</i>  <i>(1) If continuing with the work stoppage, the owner, agent, or manager shall submit a written notice of continuance every 90 days from the date of the first notice.</i></p>

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**New Subsections**

**10.6.2** (1) If a mine ceases operation, the owner, agent, or manager shall ...

*(c) continue the full maintenance and monitoring duties under the code regarding tailings storage facilities including dam safety reviews and the work required by recommendations of the engineer of record and the Independent Tailings Review Board.*

(2) If a mine ceases operation for a period longer than one year, the owner, agent, or manager shall ...

*(c) continue the full maintenance and monitoring duties under the code regarding tailings storage facilities including dam safety reviews and the work required by recommendations of the engineer of record and the Independent Tailings Review Board.*

*(d) if practicable, make such plans available on site at a conspicuous location, and provide them to communities of interest and local First Nations.*

**10.6.3** On the closure of a mine, the owner, agent, or manager shall, within 90 days file with the chief inspector accurate drawings, on a scale consistent with good engineering Practice, showing ...

*(4) a plan detailing the maintenance and monitoring of tailings storage facilities including a water balance plan, and recommendations of the engineer of record and the Independent Tailings Review Board.*

We recommend updating section 10.6.7 of the *HSRC* to reflect the new CDA Technical Guidelines 2014 and the ICOLD Bulletins from which the former CDA guidelines are largely drawn. We also recommend the chief inspector and ITRB share the power to make amendments to TSF applications.

Current	Amended
<p><b>10.6.7</b> The long-term stability of exposed slopes of major impoundments shall meet the criteria provided in the Canadian Dam Association, Dam Safety Guidelines at the time of permitting or as amended by the chief inspector.</p>	<p><b>10.6.7</b> The long-term stability of exposed slopes of major impoundments shall meet the criteria provided in the <i>Canadian Dam Association, “Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams, 2014 and the International Commission on Large Dams Bulletin 153 (2013)</i> at the time of permitting, or as amended by <i>either the Independent Tailings Review Board or the chief inspector.</i></p>

We recommend adding the “Extreme” dam classification to the requirement for an Emergency Preparedness Plan to bring s. 10.6.8 of the *HSRC* in line with the Ministry of Energy and Mines’ Guidelines for Annual Dam Safety Inspection Reports (“**MEM Guidelines**”) which “apply to every operating and closed mine in BC.”<sup>1</sup> The MEM Guidelines invoke the CDA Guidelines and the CDA Dam Classification Table from its 2014 Bulletin, “Application of Dam Safety Guidelines to Mining Dams”<sup>2</sup> (“**CDA Bulletin 2014**”)

The CDA Guidelines contain the original dam failure consequence classification table, reproduced in the CDA Bulletin as Table 3-1. The classification table has not changed since 2007 and we have reproduced it here (without footnotes) for convenience. The CDA Guidelines stipulate the classification of a dam should be “determined by the highest potential consequences, whether loss of life or environmental, cultural, or economic losses.”<sup>3</sup>

There is more, however, to analysing risk than Table 3-1 alone provides. The CDA Bulletin states: “The consequences of dam safety failure (and associated risks) and the classification can change if the dam is being raised, if there are substantial changes to the downstream environment including development, or if there are other regulatory drivers.” The CDA Bulletin notes two different approaches to dam analysis and assessment: the risk-informed approach, and the standards-based approach. The “risk-informed approach is encouraged because it includes traditional deterministic standards-based analysis among many considerations [since] the consequence classification does not address all the potential risks presented by the dam.”<sup>4</sup>

FMC submits that one major determining risk factor that should apply to dam classification is the contents of the dam, specifically the contents’ percentage of solids to water.

FMC has stated a preference for banning conventional (saturated) tailings storage, however in the alternative, we recommend a mandatory “Very High” or “Extreme” classification and Emergency Preparedness Plan for all TSFs containing tailings of 60% solids by weight or less. Our recommendations in this section fundamentally support MPRP recommendations #1 through #5 (BAT, BAP, MAC or equivalent TSF standards, feasibility studies for new projects, utilizing the ITRB, the current TSF inventory assessment) and build upon the CDA Guidelines under #7 for the interests of public safety.

1 Ministry of Energy and Mines, “Guidelines for Annual Dam Safety Inspection Reports” (August 2013). Online: <[http://www.empr.gov.bc.ca/Mining/Permitting-Reclamation/Geotech/Documents/Guidelines\\_for\\_Annual\\_Dam\\_Safety\\_Inspections\(RevisedAug2013\).pdf](http://www.empr.gov.bc.ca/Mining/Permitting-Reclamation/Geotech/Documents/Guidelines_for_Annual_Dam_Safety_Inspections(RevisedAug2013).pdf)>.

2 Canadian Dam Association, “Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams, 2014”, (Canadian Dam Association, 2014) at 18.

3 Canadian Dam Association, “Dam Safety Guidelines, 2007 (2013 Edition)” (Canadian Dam Association, Toronto, 2013) at 26.

4 Canadian Dam Association, “Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams, 2014”, (Canadian Dam Association, 2014) at 21.

Canadian Dam Association  
 Dam Classification  
 Failure Consequence (Modified)

<b>Current</b>	<b>Amended &amp; New Subsection</b>
<p><b>10.6.8</b> A major impoundment classified as high and very high failure consequence during operation and closure shall have an Emergency Preparedness Plan.</p>	<p><b>10.6.8</b> A major impoundment classified as high, very high, or extreme failure consequence under the Canadian Dam Association Classification system and the criteria under s. 10.1.8 in this code during operation and closure shall have an Emergency Preparedness Plan.                      (1) Tailings storage facilities receiving tailings containing 60% solids by weight or less shall have an Emergency Preparedness Plan at all times.</p>

Table 3-1. Dam Classification (CDA Bulletin 2014)  
 (Original Source: Table 2-1 of CDA 2013)

Dam class	Population at risk	Incremental Losses		
		Loss of life	Environment and cultural values	Infrastructure and economics
Low	None	0	Minimal short-term loss. No long term loss.	Low economic losses; area contains limited infrastructure or services.
Significant	Temporary only	Unspecified	No significant loss or deterioration of fish or wildlife habitat. Loss of marginal habitat only. Restoration or compensation in kind highly possible.	Losses to recreational facilities, seasonal workplaces and infrequently used transportation routes.
High	Permanent	10 or fewer	Significant loss or deterioration of important fish or wildlife habitat. Restoration or compensation in kind highly possible.	High economic losses affecting infrastructure, public transportation, and commercial facilities.
Very High	Permanent	100 or fewer	Significant loss or deterioration of critical fish or wildlife habitat. Restoration or compensation in kind possible but impractical.	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances).
Extreme	Permanent	More than 100	Major loss of critical fish or wildlife habitat. Restoration or compensation in kind impossible.	Extreme losses affecting critical infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances).

The CDA Bulletin 2014 discusses Emergency Preparedness and Response,<sup>1</sup> as follows:

“Section 4 of Dam Safety Guidelines (CDA, 2013) outlines key elements of emergency preparedness and response plans, which also apply to mining dams. More extensive guidance on Crisis Management and Business Recovery has been published by the Mining Association of Canada (MAC 2013).

Release of water that has been affected by mining operations can cause more damage than release of a similar amount of fresh water. In some cases, the water supply downstream can be adversely affected. These factors have to be considered in the emergency planning and development of measures to minimize the impacts resulting from a dam failure. A risk assessment of various scenarios is useful to guide the development of appropriate response and mitigative measures. The following planning considerations are provided as examples that apply specifically to mining dams:

- In addition to general access to the site (e.g. primary and secondary routes) to repair or contain damage, it may be necessary to access a specific area or segment of the dam. If access is not readily available for a potential failure scenario, then a decision should be made by the owner as to whether such access should be developed ahead of time or a plan developed to ensure that such access could be established in a timely manner.<sup>1</sup>
- Regulatory approvals (requirements and procedures) may be required before implementing certain mitigative measures such as construction of a berm in natural water courses to contain tailings and other solids.
- There may be a need to provide an alternate water supply for the potentially impacted downstream population.<sup>2</sup>

<sup>1</sup> We have drawn from the CDA recommendation (above) for providing alternate access routes to potential failure locations on a TSF, and recommend it as a requirement under section 10.1.8(a)(iii).

<sup>2</sup> It is important to note that after the Mount Polley breach, local residents of the town of Likely went without water for days, a secure water supply for months, and have reverted to their original source from Quesnel Lake but now require heavy filtration for a secure water source.

<sup>1</sup> Canadian Dam Association, “Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams, 2014”, (Canadian Dam Association, 2014) at 20, section 3.3.

The current section 10.6.9 of the *HSRC* seems to be primarily concerned with the impoundment after it has not operated for 12 months, leaving the lead-up time without any oversight or interim management plan. The conditions for work stoppages under the code and the *Mines Act* do not directly address the TSF. However, the dynamic nature of a TSF means it is still a live issue under a work stoppage or temporary shut-down, and we therefore recommend improving section 10.6.9 to reflect this fact. This will provide more oversight to TSFs during non-operational modes of the mine and assist if the TSF is in fact transitioning from the operational phase to the closure phase.

#### Current

**10.6.9** A major impoundment not operated for a period of 12 or more months may be declared as closed by the chief inspector.

#### Amended & New Subsections

**10.6.9** A major impoundment *that ceases operation shall immediately undergo an interim care plan and continue with all monitoring and maintenance in accordance with the code and the mine permit, and the manager shall*

*(1) provide an update every 3 months and report the progress of the interim closure to the chief inspector and Independent Tailings Review Board, and*

*(2) inform the chief inspector at the 12 month period whether or not the impoundment will close or reopen.*

*(3) A impoundment undergoing closure after 12 months shall be placed in the tailings storage facility inventory by the chief inspector and undergo a full long-term closure plan in accordance with the code and the mine permit,*

*(a) in accordance with the terms of the reclamation plan as approved by the Independent Tailings Review Board, and*

*(b) in accordance with the duties on the part of the owner established under the code and the Act.*

We recommend adding detailed provisions to all sections contemplating water quality and water monitoring. Notably, section 10.6.10 of the HSRC works in conjunction with section 10.7.12 - Water-courses. We have captured some key concerns in 10.6.10, as follows

**Current**

**10.6.10** Upon closure or declared closure of a major impoundment, the manager shall submit a report to the chief inspector (1) listing the steps that will be taken to ensure structural stability and runoff control, and (2) detailing the post-operational state of the dams, dikes, related seepage control works, spillway works, mine water deportment, and post-operational monitoring provisions,

**New Subsection**

**10.6.10** ... and (3) detailing all water migration pathways such as precipitation, evapotranspiration, infiltration & leachate from waste rock, heap leach, and tailings accumulations, runoff, evaporation, and groundwater flow discharge and recharge depending on the depth and concentration of the vadose zone and height of the water table, and the seepage control plan for each along with plans for adjusting to increases in migration or changes in depth of the water table.

## 10.6.12(3)

### Impoundments

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We recommend adding subsection (3) to 10.6.12 to ensure adherence to the best available global standards of impoundment closure under the CDA Bulletin 2014, and ICOLD Bulletin 153 (2013) and the latest available versions of those reference sources going forward.

#### New Subsection

**10.6.12** (3) *On final closure all tailings impoundment dams shall undergo the remediation and after care phase with the objective of achieving long term physical, chemical, ecological and social stability and a sustainable environmentally appropriate after use in accordance with the Canadian Dam Association Guidelines Technical Bulletin 2014, and the International Commission on Large Dams Bulletin 153 (2013).*

## 10.6.13 Correction

### Decommissioning of Water Structures

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Since the *Waste Management Act* was repealed in 2003, we offer updated language in section 10.6.13 of the *HSRC* accordingly.

#### Current

**10.6.13** A water reservoir or pond declared inoperative by the chief inspector shall be breached or otherwise disposed of in accordance with the license under the *Water Act* or permit under the *Waste Management Act*.

#### Amended

**10.6.13** A water reservoir or pond declared inoperative by the chief inspector shall be breached or otherwise disposed of in accordance with the license under the *Water Act* or permit under the *Environmental Management Act*.

Re-vegetation requires expert knowledge and care. To aid in the application of Best Available Technology and Best Applicable Practices for re-vegetation under MPRP recommendation #1, and the assessment of the re-vegetation needs for remediation of the existing TSF inventory in recommendation #5, we recommend amendments to section 10.7.7. The amendments will also help increase the viability of feasibility studies in accordance with MPRP recommendation #3.

Our recommended amendments to section 10.7.7 include requiring that re-vegetation plans be prepared by a registered biologist. We have also recommended a requirement that the re-vegetation plan be referred to other agencies, especially the Ministry of Forests, Lands, and Natural Resource Operations under section 10.3.3, and the Tailings Advisory Committee under section 10.3.4.

<b>Current</b>	<b>Amended &amp; New Subsections</b>
<p><b>10.7.7</b> On all lands to be re-vegetated, land shall be re-vegetated to a self-sustaining state using appropriate plant species.</p>	<p><b>10.7.7</b> <i>All lands under reclamation shall be re-vegetated to a self-sustaining state that restores the ecosystem in place prior to the mining activity, utilizing</i></p> <ul style="list-style-type: none"> <li><i>(1) A re-vegetation plan prepared by a registered professional biologist, and</i></li> <li><i>(a) test plots,</i></li> <li><i>(b) appropriate local or regional species,</i></li> <li><i>(c) restoration of biological integration of the habitat,</i></li> <li><i>(d) a model fitting the specified land use,</i></li> <li><i>(e) traditional knowledge of local First Nations as requested, and</i></li> <li><i>(f) management of grass cover bi-annually to establish a low, controlled, dense vegetation.</i></li> </ul>

**Authority / Reference**

*California Surface Mining and Reclamation Act of 1975, 2 Cal § 3705(b) (2007). Or Rev Stat vol 12 c 517 §956(3)(c).*

continued

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**Amended & New Subsections (continued)**

- 10.7.7** (b) *The registered biologist shall specify key outcomes in the re-vegetation plan including*
- (i) *test plot programs before full scale re-vegetation efforts begin;*
  - (ii) *a self-sustaining and fully re-vegetated state for 5 continuous years;*
  - (iii) *re-vegetation for 10 years with at least 2 successive years without irrigation in areas with less than 650 mm average annual precipitation;*
  - (iv) *semi-annual inspections;*
  - (v) *annual pH evaluations of soil nutrients in the spring until vegetation is successfully established*
- (c) *Once vegetation has been established, the registered biologist shall*
- (i) *conduct annual inspections to identify any necessary adjustments, and*
  - (ii) *include necessary adjustments in the action plan for implementation by the owner toward the final goal of a self- sustaining ecosystem.*

**Authority / Reference**

*California Surface Mining and Reclamation Act of 1975, 2 Cal § 3705(j) (2007).  
Mine Development and Closure, O Reg 240/00, Schedule 1, s 77(1) (2), 78.  
Surface Mining Control and Reclamation Act ,USC , tit 30 c 25 §1265(b)(20).  
Wash Rev Code tit 78 § 44.141(7)(a)2011).*

Topsoil conservation is another key consideration for achieving successful site re-vegetation. Establishment and long term maintenance of good growth media will aid the successful re-vegetation of the mine site, which will improve long term stability and integrity of TSF. Good topsoil conservation represents a best practice which will similarly support MPRP recommendations #1 and #5 as in the section 10.7.7 amendment. It is also a best practice for all phases of reclamation on all existing TSFs, and if included in a closure plan at the start of development, can support the feasibility study contemplated under MPRP recommendation #3.

**Current**

**New Subsections**

**10.7.8** On all lands to be re-vegetated, the growth medium shall satisfy land use, capability, and water quality objectives. All surficial soil materials (including topsoil) removed for mining purposes shall be saved for use in reclamation programs unless these objectives can be otherwise achieved.

**10.7.8** (1) Reclamation plans shall include specific plans for topsoil conservation.  
(2) Topsoil shall not be removed earlier than 1 year prior to start of mining activity on that area of the site.  
(3) Topsoil removed during mining activities shall be segregated from other soil for later use in re-vegetation efforts.

**Authority / Reference**

California Surface Mining and Reclamation Act of 1975, 2 Cal §3711(a) (2007).  
Colorado Mined Land Reclamation Act, Colo Rev Stat tit 34 § 32-116(7)(f).  
Wash Rev Code tit 78 § 44.091 (1)(k)(2011) .

**New Subsections (continued)**

- 10.7.8** (4) *Where topsoil is not replaced within a short enough time period to avoid deterioration, other means shall be employed to ensure topsoil is in a suitable condition for sustaining vegetation in accordance with section 10.7.7 by:*
- (a) *preserving the topsoil from erosion by planting it with a vegetative cover to prevent water and wind erosion and to discourage weeds, and*
  - (b) *segregating topsoil so that it remains free of any contamination by other acid or toxic material.*
- (5) *All reclaimed areas must be scarified prior to re-vegetation by ripping, disking, or other similar means to adequately prepare the ground prior to replanting.*

**Authority / Reference**

*California Surface Mining and Reclamation Act of 1975, 2 Cal §3705(c)(2007).  
Colorado Mined Land Reclamation Act, Colo Rev Stat tit 34 § 32-116(7)(f).  
Mine Development and Closure, O Reg 240/00, ss 71(4), 72(3), 73(2), 74(1).  
Surface Mining Control and Reclamation Act, tit 30 USC c 25 § 1265(b)(5).  
Wash Rev Code tit 78 § 44.141(4)(i)(2011) .*

We recommend amending section 10.7.9 of the HSRC by requiring clarification of the description of final site topography requirements and requiring assessments of the effect of mine workings on the stability of the ground surface. This will inform the original TSF design commitments and mine plan under MPRP recommendation #3, and reduce the risk of post-closure liabilities by the use of a clear plan for landform restoration with specific outcomes within a specified time.

#### New Subsections

- 10.7.9** (1) *To avoid subsidence, the closure plan must include a description of the effect of all mine openings on the stability of the above surface areas and adjacent areas used for mining activities to determine whether the surface area is likely to be disturbed.*
- (2) *Final site topography must be re-established for site reclamation and be similar to the adjacent topography,*
- (a) *by using a blend of contours, chutes, and rolling landforms, and*
  - (b) *avoiding*
    - (i) *flat surfaces,*
    - (ii) *unnatural surfaces,*
    - (iii) *impediments to natural drainage,*
    - (iv) *hazards to persons or wildlife.*
- (3) *the final landforms cannot exceed surface contour elevations in place prior to mining by more than 8 meters.*

Watercourse restoration must include the re-establishment of meandering flow patterns to be effective. Although rebuilding watercourses to their original state is mandated in the *HSRC*, section 10.7.9(b) only contains a vaguely worded clause that, in our opinion, is too discretionary in allowing the owner, agent, or manager to claim that certain watercourse restoration is impractical. Inadequate watercourse restoration creates a poor mining legacy which can be mitigated and kept out of the taxpayers’ domain if carried out effectively at the outset of reclamation. Clarity around this important issue will help implement the use of BAT and BAP in MPRP recommendation #1, serve the interests of recommendation #3, and inform the water balance concerns under recommendation #5a(ii),(iii).

**Current**

**10.7.12** Watercourses shall be reclaimed to a condition that ensures  
 (1) drainage is restored either to original watercourses or to new watercourses which will sustain themselves without maintenance, and  
 (2) the level of productive capacity shall not be less than existed prior to mining, unless the owner, agent or manager can provide evidence which demonstrates, to the satisfaction of the chief inspector, the impracticality of doing so.

**Amended & New Subsections**

**10.7.12** Watercourses shall be reclaimed to a condition that ensures  
 (1) drainage is restored either to original watercourses or to new watercourses which will sustain themselves without maintenance, *and graded, to include,*  
 (a) *restoration of meandering watercourses, and*  
 (b) *rehabilitation of all stream beds and stream-banks to minimize erosion and sedimentation, and*  
 (2) the level of productive capacity shall not be less than existed prior to mining, *and shall contain adequate energy dissipation to re-establish natural water velocity, volume, and turbidity. Watercourse reclamation shall be completed within 6 months of reclamation of each segment of the mine.*

Related Legislation		
Section	Statute	
Part 4, Division 7, s 64	<i>Environmental Management Act</i>	Director’s Protocols

**Authority / Reference**

Wash Rev Code tit 78 § 44.141(4)(d).  
*California Surface Mining and Reclamation Act of 1975*, 2 Cal §3704.1(c)(e) (2007).  
*Mine Closure Regulation*, Man Reg 67/99, s 9.

We recommend amending sections 10.7.14 - 10.7.16 of the *HSRC* to require backfilling of pits as the first option. In descending order of preferred methods, after backfilling, flooding may be considered as long as it is proven viable and is monitored by a professional engineer, and sloping should be allowed only as a last alternative.

These provisions can positively impact the overall site water balance and surface stability. Planned ahead of time they may also be part of a thorough feasibility study and mine plan under MPRP recommendation #3, aid in strengthening the regulatory operations under recommendation #5, and address public safety concerns from leftover open pits under recommendation #7.

<b>Current</b>	<b>Amended</b>
<b>10.7.14</b> Pit walls including benches constructed in rock, and/or steeply sloping footwalls, are not required to be re-vegetated.	<b>10.7.14</b> <i>All pits must be backfilled unless absolutely impractical to do so as provided in the conditions of an approved closure plan.</i>
<b>10.7.15</b> Where the pit floor is free from water, and safely accessible, vegetation shall be established.	<b>10.7.15</b> <i>Sloping may only be used if it can be demonstrably justified, as shown in the approved closure plan.</i>
<b>10.7.16</b> Where the pit floor will impound water and it is not part of a permanent water treatment system, provision must be made to create a body of water where use and productivity objectives are achieved.	<b>10.7.16</b> <i>As an alternative to backfilling, pits may be flooded if it can be demonstrably justified in the closure plan, and the flood plan undergoes a regularly scheduled monitoring program by a professional qualified engineer in order to predict the water elevation within the pit and make recommendations to ensure the continued effectiveness of flooding.</i>

#### Authority / Reference

*Mine Development and Closure*, O Reg 240/00, Schedule 1, ss 21(1),(2),(3),(4)  
*Mine Development and Closure*, O Reg 240/00, Schedule 1, s 23(d)

TSF closure considerations should begin during design and construction, and the MPRP recognizes this for new TSFs stating: “Safety attributes should be evaluated separately from economic considerations, and cost should not be the determining factor”<sup>1</sup> Again, addressing a way to “expand corporate design commitments” per MPRP recommendation #3, and support an investment decision, the MPRP states a bankable feasibility study should contain: “Detailed cost analyses of BAT tailings and closure options, so that alternative means of achieving BAT can be understood and accommodated [and] this assessment should recognize that indirect and unquantifiable costs cannot be fully incorporated and hence the results of the cost analyses should not supersede BAT safety considerations”<sup>2</sup>

These considerations also apply to MPRP recommendations #5 to aid in the provincial TSF inventory assessment, and apply to MPRP recommendation #7 for incorporating statutory requirements that emphasize public safety. We therefore propose amendments to sections 10.7.17 & 10.7.18 and 10.7.25 - 10.7.31 of the *HRSC* to incorporate these MPRP recommendations. Realizing dam classification is dependent on factors outside the control of the miner, we nonetheless begin with section 10.7.17 and a focus on reducing the dam classification post-closure by taking all measures within the miner’s control. Some of our amendments use language directly from the CDA Bulletin 2014.

<b>Current</b>	<b>New Subsections</b>
<p><b>10.7.17</b> All tailings ponds and impoundment structures shall be reclaimed to the approved land use.</p>	<p><b>10.7.17</b> (1) <i>Where possible</i> tailings ponds and impoundment structures shall be decommissioned.</p> <p>(2) <i>Where decommissioning is not possible, tailings dams and impoundments shall have their failure classification reduced by:</i></p> <ul style="list-style-type: none"> <li>(a) <i>removal of water,</i></li> <li>(b) <i>reduction of risk and extent of flow failure by improving strength of liquifiable materials and,</i></li> <li>(c) <i>lowering height of contents by reshaping the surface and perimeter dam slopes, considering the quantity, physical and chemical properties, and settlement characteristics of the contents.</i></li> </ul>

<sup>1</sup> “Report on Mount Polley Tailing Storage Facility Breach”, Independent Expert Engineering Investigation and Review Panel (Government of British Columbia, Queen’s Printer, 30 January, 2015) at 125.

<sup>2</sup> “Report on Mount Polley Tailing Storage Facility Breach”, Independent Expert Engineering Investigation and Review Panel (Government of British Columbia, Queen’s Printer, 30 January, 2015) at 128.

The 2013 Annual Report of the chief inspector of mines did not provide details on which TSFs were inspected in that calendar year, but overall only 25% of TSFs in the Province received a geotechnical inspection. The MPRP indicated the monitoring and maintenance at the Mount Polley impoundment was somewhat lacking, experienced equipment breakages, and was hampered by the non-implementation of recommended repairs.

Given these factors we propose amendments to section 10.7.18 of the HSRC that incorporate the CDA Bulletin 2014 recommendations (specifically the concept of the “design interval”<sup>1</sup>) for success in TSF closure.

#### Current

**10.7.18** Impoundment facilities shall be inspected, monitored and maintained to ensure stability.

#### Amended & New Subsections

**10.7.18** ... and

(1) A closure program for tailings storage facilities shall commence with a new risk assessment and subsequent updating of the OMS to establish the maintenance and surveillance regime during closure.

(2) The closure, maintenance, and surveillance regime shall take into account the Annual Exceedance Probability for earthquakes determined under section 10.1.8.

(3) Tailings storage facilities shall be given criteria to account for the decline in available monitoring and emergency response time for design intervals exceeding 20 years.

(4) Criteria for analysis and assessment of the closure program shall be in accordance with the Canadian Dam Association Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams 2014.

<sup>1</sup> Canadian Dam Association, “Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams, 2014”, (Canadian Dam Association, 2014) Section 3.0, pp 14-29.

## 10.7.25

*TERMS of REFERENCE*

3 7

### Monitoring Vegetation

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Metal uptake occurs not only in vegetation but in all biota and as such is a primary pathway for TSF contaminants to enter the environment.<sup>1</sup> As such, we recommend that metal uptake monitoring be mandated for closure plans, as follows:

#### Current

**10.7.25** When required vegetation shall be monitored for metal uptake.

#### Amended

**10.7.25** *The closure plan shall include a metal uptake monitoring program.*

## 10.7.26

*TERMS of REFERENCE*

3 7

### Ecological Risk Assessment

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Conducting a well designed and adequate impact assessment that includes quantification of social, cultural, health, and economic considerations is a critical component to evaluating the full scope of benefits and costs of mining operations.

#### Current

**10.7.26** When required by the chief inspector, the owner, agent or manager shall commission an ecological risk assessment.

#### Amended

**10.7.26** *The owner, agent, or manager shall perform a well designed and adequate ecological impact assessment.*

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<sup>1</sup> A.S. Maest, J.R. Kuipers, C.L. Travers, and D.A. Atkins, "Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties, and State-of-the-Art" (Kuipers & Associates, Buka Environmental, Boulder, 2005) discusses metal uptake as a contamination pathway in pp 5, 6, 8, & 39.

Plant and animal life around mine sites can be exposed to elevated levels of contaminants which can result in negative impacts to ecological systems, human health and loss of use of the area for harvest and cultural activities. Utmost attention must be given to adequate assessment of short and long-term impacts. Where impacts are predicted and/or found, it is imperative that measures to avoid, mitigate and remediate impacts are undertaken by the mine operator both during and after operations.

**Current**

**10.7.27** Where there is a significant ecological risk, reclamation procedures shall ensure that levels are safe for plant and animal life and, where this cannot be achieved, other measures shall be taken to protect plant and animal life.

**Amended & New Subsections**

**10.7.27** Where there *are indications of* ecological risk, reclamation procedures shall ensure that levels are safe for plant and animal life and, where this cannot be achieved, other measures, *including, but not limited to the following*, shall be taken to protect plant and animal life:

- (a) *annual testing of metal uptake until baseline levels of metal uptake are achieved, after which metal uptake surveys will be undertaken every 5 years,*
- (b) *re-vegetation will be completed with indigenous vegetation not used by wildlife or people for forage or food,*
- (c) *fencing to prevent access shall be installed if food or forage species are present, and*
- (d) *after mine closure, signage that indicates danger of using contaminated vegetation as food source shall be placed in conspicuous locations.*

**Authority / Reference**

Indian and Northern Development, Canada, "Mine Site Reclamation Policy for the Northwest Territories" (Ottawa: Minister of Public Works and Government Services Canada, 2007) at 21.

## Disposal of Chemicals and Reagents

3 7

A wide variety of chemicals, fuel, and lubricants are generally used at mine sites. Sufficient care must be taken to ensure these toxic chemicals are not released into the environment during or after mining activities are complete. We recommend a new subsection to section 10.7.28 that extends the responsibilities for the disposal of chemicals and toxins beyond simple removal, and includes the testing and removal of any contaminated soil.

## Current

**10.7.28** Chemicals or reagents, which cannot be returned to the manufacturer, shall be disposed of in compliance with municipal, regional, provincial and federal statutes.

## Amended &amp; New Subsection

**10.7.28** (1) *Upon the removal of all chemicals, reagents, lubricants, and fuels, the owner, agent, or manager shall test the soil in the immediate vicinity of the storage sites and dispose of any contaminated soil and associated contaminated waters.*

## Authority / Reference

*Mine Closure Regulation, Man Reg 67/99, s 15(2)(j).*

**Monitoring**

3 5 7

Water quality indicators from impacts during or shortly after mining may be the only evidence to indicate how future effects will occur, depending on conditions and the nature of the tailings (weathering, acid production, and neutralization components).

However, if no indicators emerge to offer any data, the closure plan must use forward models, using existing water quality and mineralogical information, to predict potential future water quality. Reclamation and closure planning must take into account both existing and future conditions in order to be effective at restoring post-mining utility to the land and at protecting future water quality.

Site conditions, and potential pathways for transport of contaminants from sources to water resources, during the closure/post-closure period include: precipitation, evapotranspiration, infiltration & leachate from waste rock, heap leach, and tailings accumulations, runoff, evaporation, and groundwater flow discharge and recharge depending on the depth and concentration of the vadose zone and height of the water table.

Therefore, we recommend amendments to section 10.7.29 of the HSRC to account for these concerns and to support and inform MPRP recommendation #1 to enhance BAT and BAP in TSF design to account for long-term water issues, strengthen feasibility studies under #3, enhance the inventory risk assessment and plan for mitigation under #5, and increase public safety by ensuring a long-term commitment to a vigilant water safety monitoring program under #7.

**Current**

- 10.7.30** The owner, agent, or manager shall undertake monitoring programs, as required by the chief inspector, to demonstrate that reclamation and environmental protection objectives including land use, productivity, water quality and stability of structures are being achieved.

continued

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#### Amended & New Subsections

- 10.7.30** The owner, agent, or manager shall undertake monitoring programs, as required by the chief inspector, to demonstrate that reclamation and environmental protection objectives including land use, productivity, *ecology*, water quality and stability of structures are being achieved.
- (1) *The land use, productivity, and ecology monitoring programs will be designed by a registered professional biologist.*
- (2) *A professional engineer shall undertake an annual onsite review of the tailings storage facilities, and other structures.*
- (3) *Tailings storage facility monitoring equipment, shall be checked and upgraded where necessary to the Best Available Technology standards and installed and maintained in good working order.*
- (4) *The mine owner, agent or manager shall submit annual reports to the chief inspector, the Independent Tailings Review Board, First Nations, and communities of interest. The reports shall be made publicly available on the Ministry's website within 30 days of being finalised.*

#### Authority / Reference

A.S. Maest, J.R. Kuipers, C.L. Travers, and D.A. Atkins, "Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties, and State-of-the-Art" (Kuipers & Associates, Buka Environmental, Boulder, 2005) at 12, 13.

## Release of Obligations

1 3 5

The release of obligations and the return of security deposits raise many key issues concerning the closure phase of the mine and the assignment of liability. The current *HSRC* provision (section 10.7.31) leaves many questions not the least of which is around the sole discretion of a single individual - the chief inspector - for the myriad issues that can arise in post-closure.

Implementing the MPRP recommendations for the enhancement of all phases of a TSE, improved corporate governance, and a strengthened regulatory regime means the closure, reclamation, and after care phases of a mine must all be closely monitored for a significant, sustained period of time before any security amount is returned. The need for this has been reflected throughout BC's mining history on numerous occasions such as the Britannia Mine, and the Tulsequah Chief mine in northwestern BC near the town of Atlin and the Alaska border which is still leaking acid mine-generated toxins into the waterways.

In our Authority / Reference section (see following page) for our amendments to *HSRC* section 10.7.31, we have included provisions from statutes of several jurisdictions which place conditions on the release of obligations and return of securities.

**Current**

**10.7.31** If all conditions of the act, code and permit have been fulfilled to the satisfaction of the chief inspector and there are no on-going inspection, monitoring, mitigation or maintenance requirements, the owner, agent or manager will be released from all further obligations under the *Mines Act*.

continued

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### New Subsections

- 10.7.31** (1) *Before the release of obligations and the return of securities, the chief inspector shall*
- (a) *undertake a thorough site inspection,*
  - (b) *establish a forum for a public hearing on the matter and post notice in 2 newspapers, the ministry website, and one television broadcaster, announcing the opportunity for a public hearing,*
  - (c) *undertake consultation and accommodation with all First Nations,*
  - (d) *consult with communities of interest and local land owners and receive any applications from these parties for outstanding issues, grievances, or concerns, and*
    - (i) *in the event of a grievance in (d) the chief inspector shall fully consider each and not release the security until the issues are resolved between the aggrieved party and the proponent.*
  - (e) *phase the return of securities over a minimum of 5 years from the date of release of obligations on a percentage basis determined by the chief inspector and based on any outstanding restoration requirements, environmental concerns, or grievances of affected parties, and*
  - (f) *receive demonstrable evidence of a self-sustaining ecological state for the final 2 year of the 5 year period in section (e) prior to the return of any security amounts.*

### Authority / Reference

*California Surface Mining and Reclamation Act of 1975, 2 Cal § 3705(j)(2007).*  
*California Surface Mining and Reclamation Act of 1975, 2 Cal § 3805.5(a)(1)(2007).*  
 Colo Reg, Minerals Program Rules and Regulations, §7.2.10.  
*Environmental Quality Act, Wyo Stat tit 35 § 11-417(e).*  
*Mine Closure Regulation, Man Reg 67/99, s 15(2)(j).*  
*Mined Land Reclamation Act, Colo Rev Stat tit 34 § 32-117(5)(a)(2011).*  
*Mineral Resources (Sustainable Development) Act 1990, (Vic) ss 82.2, 83(5)(6).*  
 Mont Code Ann tit 82 c 4 § 338(5)(2011).  
 N Mex Stat Ann § 69-36-7.R(2).  
 Or Rev Stat vol 12 c 517 § 987(6)(b)(2011).  
*Surface Mining Control and Reclamation Act, USC, tit 30 c 25 §1269(a)(b)(c).*

*Mines*

**MINES ACT**

*Act*

## Definitions

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We recommend adding the following definitions to the *Mines Act* to fulfil MPRP recommendation #4: the utilization of ITRBs, and MPRP recommendations #1, #2, & #3, which would see the MAC guidelines and BAT and BAP become standard corporate governance and corporate design practices.

Proponents will thereby be required to accurately evaluate all potential failure modes, calculate an effective cost/benefit analysis and support accurate pre-feasibility studies. Our proposed amendments also relate to the application of these new standards to the TSF inventory review in accordance with MPRP recommendation #5.

We differ, however, from the MPRP's definition of the ITRB. FMC's position is that in order to regain public and investor confidence, the process for vetting tailings storage facilities must be completed through a single provincial ITRB as defined in our proposed *Mines Act* amendments.

We also recommend the whole provincial TSF inventory undergo examination and assessment by the ITRB, rather than limiting the review only to a select few facilities. In all other regards, however, we agree with the MPRP and its call for openness and transparency in an ITRB.

To ensure liability is not transferred to the ITRB members, we propose creating an immunity provision in section 3.3 of the *Mines Act*.

Where the chief inspector requires assistance with the workload for permitting, operational, maintenance or other issues around TSFs, we have proposed the creation of the smaller, subordinate Tailings Advisory Committee, as needed, and governed by provisions already in place under Part 10, (including our new proposed section 10.3.4) of the *HSRC*.

The creation of a qualified community representative fulfils the MAC provisions which place "Communities of Interest" at the decision table along with CEOs and Board Members, and also enhances recommendation #7's emphasis on "public safety".

## Proposed New Definitions

### Definitions

1 In this Act:

**“Best Applicable Practice”** means corporate, regulatory, technical, and professional practices that are most protective of the environment as a whole, and applicable to the safe operation and management of a mine site;

**“Best Available Technology”** means the most advanced technology available on the market and applicable to the development stages of mining activities and methods of operation;

**“Community of Interest”** means any community within the geographic, environmental, or economic sphere of mining activities where any significant exploration activity, or development, operation, closure, or post-closure activities of a mine may directly impact the community, its people, and/or its surrounding environment;

**“community representative”** means a person or persons from a Community of Interest meeting the requirements of “qualified person” under the *Act* and empowered by the minister or chief inspector as a designated liaison between the mine and the affected community;

**“Independent Tailings Review Board”** means a review board formed by the Minister under section 3.1 of the *Act*;

**“Tailings Advisory Committee”** means a committee formed as needed by the minister or chief inspector under section 9.1 of the *Act*, and acting in accordance with the advisory committee provisions set out in the code;

We recommend that the resources available to the ITRB and TACs include the MAC audit and assessment checklists in chapters 3 and 4 of “A Guide to Audit and Assessment of Tailings Facility Management, 2011” (“MAC Guidelines”).

The audit section of the MAC Guidelines contains 15 topics with 86 detailed questions, and the assessment section requires the appraiser to evaluate whether or not the application “Meets Threshold Expectations” - which includes meeting objectives and outcomes, creating accountability, and conforming to the law. The assessment section also asks the “Leadership Position” on each topic to establish the awareness and participation levels of management in all aspects of the TSF. The main topics for audit and assessment are as follows:

### *Tailings Management System Audit*

- Policies and Commitment
- Roles and Responsibilities
- Objectives
- Managing for Compliance
- Managing Risk
- Managing Change
- Resources and Scheduling
- Emergency Preparedness and Response
- Operational Control
- Financial Control
- Documentation
- Training, Awareness and Competency
- Communication
- Checking and Corrective Action
- Management Review for Continual Improvement

The MAC Guidelines are notable for another reason: Communities of Interest are placed in the top echelon of decision-makers along with CEOs and Boards of Directors and are included in every aspect of the audit and assessment. Incorporating this feature as a mandatory requirement would represent a much needed change in BC mining law and governance as communities affected by mining activities would finally have a voice in the process.

## 3.1

### Independent Tailings Review Board

*TERMS of REFERENCE*

1 2 3 4 5 6 7

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We propose adding the following sections 3.1 and 3.2 to the *Mines Act* to complete the formation of the ITRB and appointment of community representatives under *Mines Act* section 1 “Definitions”. The formation of an ITRB falls directly under MPRP recommendation #4 but will affect the intent and purpose of all MPRP recommendations since the ITRB will assess the full scope of TSFs.

#### New Section

- 3.1 *The minister shall designate in writing a committee to act as an Independent Tailings Review Board to oversee the design, construction, operation, maintenance, closure, reclamation and where applicable, decommissioning of each tailings storage facility in the province. Members of this board shall include a person or persons designated by local First Nations.*

## 3.2

### Powers of Independent Tailings Review Board

*TERMS of REFERENCE*

1 2 3 4 5 6 7

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#### New Section

- 3.2 (1) *The Independent Tailings Review Board shall have authority to approve or reject new plans and to accept, reject, or make amendments to any other application concerning tailings storage facilities.*

The ITRB should be held to the highest professional standards, but its members will require immunity from the outcomes of the ordinary, good faith performance of their duties, as final responsibility for the maintenance and successful operation of a TSF lies with the operator.

#### New Section

- 3.3 (1) *Subject to subsection (2), no action lies and no proceedings may be brought against an Independent Tailings Review Board (ITRB) member because of*
- (a) *any*
    - (i) *act, advice, including pre-application advice, or recommendation, or*
    - (ii) *failure to act, failure to provide advice, including pre-application advice, or failure to make recommendations in relation to this Act, regulations under this Act, or any matter relating to any action taken during the course of duty involving an application concerning a tailings storage facility,*
  - (b) *any*
    - (i) *purported exercise or performance of powers, duties or functions, or*
    - (ii) *failure to exercise or perform any powers, duties or functions arising under this Act, or regulations under this Act.*
- (2) *Subsection (1) does not provide a defence if, in relation to the subject matter of the action or proceedings the ITRB member was dishonest, malicious or committed wilful misconduct.*
- (3) *Without limiting subsection (1), if honest reliance is made by a person without malice or wilful misconduct on the contents of an ITRB determination, ITRB members are not liable for damages arising from reliance on the determination.*

**Designated Community Representative**

We recommend that the Designated Community Representative (“DCR”) occupy a unique position unlike any other in BC mining history. By undertaking the duties that we recommend, he or she will: be apprised of the status of the mine and the TSF(s); become involved in the social and economic aspects behind corporate commitments and good governance; stay current on any TSF in the provincial inventory that is within the scope of his or her community; and have a direct line into the current status of any public safety concerns that may affect the community.

We have established a basic framework here in our proposed section 3.4 of the *Mines Act*, but more work is required to determine the details, such as a clear and complete list of requirements, restrictions, duties to the community, indemnification, the level of pay and who will cover the cost, and the full selection process, among other considerations.

This preliminary recommendation also contemplates a DCR’s relationship with a mine under development or in operation. Provision should also be made for the duties of a DCR to extend to the relationship with mining companies in the exploration phase.

**New Section & Subsections**

- 3.4** *Communities of Interest as defined in the Act shall put forward names for selection by the chief inspector as designated community representatives, and one alternate, and be appointed for a period of one year to fulfil on behalf of their communities*
- (1) meeting with the mine manager, mill maintenance superintendent, and on site engineer for updates on all matters concerning the operation of the mine and the tailings storage facility or facilities as needed.*
  - (2) The Designated Community Representative shall have at all times access to*
    - (a) all environmental monitoring data,*
    - (b) all dam safety reports, and*
    - (c) open lines of communication with mine employees.*

Unlike the ITRB which oversees the provincial TSF inventory and makes final decisions regarding TSFs, many administrative processes undertaken by the Ministry will require a more utilitarian body to help with the practical TSF workload.

The HSRC already contemplates the formation and use of advisory committees under section 10.3. In light of Mount Polley, FMC proposes a new emphasis on the use of an advisory committee expressly for the purpose of aiding the chief inspector in the permitting, operation, and maintenance issues arising around TSFs in general, as well as the new inspection regime we propose under section 15 of the *Mines Act*. TACs could fulfil other roles, such as aiding environmental assessment review panels on mining project proposals under review. Therefore, we propose adding a new section 9.1 to the *Mines Act* mandating the creation and use of TACs.

#### New Section & Subsections

- 9.1** (1) *The minister or the chief inspector shall establish one or more temporary tailings advisory committees as needed specifically for the purpose of assisting the chief inspector with new applications and application amendments or revisions for tailings storage facilities in the permitting and operational phases, as well as for ongoing maintenance.*
- (2) *Each tailings advisory committee shall report directly to the Independent Tailings Review Board, and submit an opinion on approval or conditional approval of an application.*
- (3) *In reviewing applications under (1) the tailings advisory committee shall consider each application on its merits for:*
- (a) *use of Best Available Technology in site planning, construction, design, operation, maintenance, closure, and where applicable decommissioning,*
  - (b) *use of Best Applicable Practices in site planning, construction, design, operation, maintenance, closure, and where applicable decommissioning, and*
  - (c) *consistency with current Mining Association of Canada Guidelines, specifically the Audit and Assessment Guidelines.*

## Permits - No Misrepresentation of Mineral Reserves

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MPRP recommendation #3 mentions a “bankable feasibility study” with “an accuracy of +/- 10% - 15%” before making an investment decision on a TSF. An investment decision on a TSF is really a decision on whether or not to undertake production - in other words, given all the available information and data, will the mine be profitable under the proposed model?

Due to many factors, not the least of which is an often volatile market, miners have been digging deeper to find the bottom line dollar and stretching their estimates for production based on what is, in truth, un-bankable information and data. Securities’ administrators are seeing preliminary economic assessments (“PEAs”) submitted as pre-feasibility studies (“PFS”) or feasibility studies (“FS”). All three studies generally analyse and assess the same geological, engineering, and economic factors, but the PEA lacks the level of detail necessary for a qualified and confident investment decision, and more importantly a PEA does not meet current Canadian legal requirements for the NI 43-101 report.

The Canadian Securities Administrators (“CSA”) have identified several serious concerns regarding misrepresentation of data in NI 43-101 technical reports. PEAs are being used as substitutes or proxies for PFSs and FSs as issuers present their PEA, or components of it, at or close to the level of a PFS. They present the PEA as a PFS with inferred mineral resources even though inferred resources are not allowed in a PFS or FS.<sup>1</sup>

Any inclusion of uncertain data in a PFS or FS requires a prominent and cautionary statement per section 3.4(e) of the NI 43-101: “This cautionary language is in addition to the cautionary statement for inferred mineral resources required by section 2.3(3)(a) [because any] disclosure that implies the PEA has demonstrated economic or technical viability would be contrary to NI 43-101 and the definition of PEA.”<sup>2</sup>

Yet even under these standards the CSA has encountered:

1. Potentially misleading PEA results where issuers and qualified persons use “overly optimistic or highly aggressive assumptions in the PEA, or methodologies that diverge significantly from industry best practice guidelines and standards for exploration and mineral resources”<sup>3</sup>
2. PEA disclosure that “includes by-products where issuers are disclosing the results of a PEA that includes projected cash flows for by-product commodities that are not included in the mineral resource estimate. This situation can arise where there is insufficient data for the grades of the by-products to be reasonably estimated or estimated to the level of confidence of the mineral resource”<sup>4</sup>

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<sup>1</sup> Canadian Securities Administrators Staff Notice 43-307, Mining Technical Reports, Preliminary Economic Assessments, August 16, 2012; online: <[https://www.osc.gov.on.ca/en/SecuritiesLaw\\_csa\\_20120816\\_43-307\\_mining-tech-rpts.htm](https://www.osc.gov.on.ca/en/SecuritiesLaw_csa_20120816_43-307_mining-tech-rpts.htm)>.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

## Permits - No Misrepresentation of Mineral Reserves (cont.)

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3. Issues with “the relevant experience of the Qualified Person giving rise to situations where individuals are taking responsibility for technical reports or parts of reports that support the results of a PEA, while not fully complying with the requirement to have experience relevant to the subject matter of the mineral project and the technical report”.<sup>1</sup>

Notwithstanding “the making of false statements with respect to the amount of valuable minerals obtained under a [mining] lease or license”<sup>2</sup> contravenes section 394.1(b) of the *Criminal Code of Canada*, the practice of blurring the lines between PEAs and the PFS or FS continues. The British Columbia Securities Commission (“BCSC”) has flagged the exact same issues with NI 43-101 reports and also highlights how the problem has flowed from mining companies, through NI 43-101 reports, and into all public relations and promotional representations. This means public perception is not informed by the true nature of viability of mining projects.

“We find that a company’s disclosure in websites, investor relations materials, email promotions, social media sites, and corporate presentations (voluntary disclosure) is less likely to comply than its news releases, technical reports, annual information forms (AIF), and management discussion and analysis (MD&A) (required filings).”<sup>3</sup>

Therefore, FMC proposes an amendment to address this serious issue. We are of the view that no mineral production or TSF construction should be undertaken based on enhanced feasibility studies. We maintain that the law is (and should remain) clear in this regard.

### New Section

**10 (1.01)** *Despite any provision of this Act or any other Act, regulation, code, bulletin, policy, or guideline, no mine permit shall be issued for a mine based on any representation of mineral resources as mineral reserves, or reference to inferred mineral resources as ore or mineral reserves.*

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1 Canadian Securities Administrators Staff Notice 43-307, Mining Technical Reports, Preliminary Economic Assessments, August 16, 2012; online: <[https://www.osc.gov.on.ca/en/SecuritiesLaw\\_csa\\_20120816\\_43-307\\_mining-tech-rpts.htm](https://www.osc.gov.on.ca/en/SecuritiesLaw_csa_20120816_43-307_mining-tech-rpts.htm)>.

2 *Criminal Code* RSC 1985, c C-46, s 394(1) “No person who is the holder of a lease or licence issued under an Act relating to the mining of valuable minerals, or by the owner of land that is supposed to contain valuable minerals, shall (a) by a fraudulent device or contrivance, defraud or attempt to defraud any person of (i) any valuable minerals obtained under or reserved by the lease or licence, or (ii) any money or valuable interest or thing payable in respect of valuable minerals obtained or rights reserved by the lease or licence; or (b) fraudulently conceal or make a false statement with respect to the amount of valuable minerals obtained under the lease or licence.”

3 British Columbia Securities Commission, 2012 Mining Report, January 2013; online: <[http://www.bcsc.bc.ca/For\\_Companies/Mining/](http://www.bcsc.bc.ca/For_Companies/Mining/)>.

**Permits - Past Performance Determination**

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In conjunction with our proposed amendments to sections 10.1.1 and 10.1.2 of the *HSRC* which mandate a background check on miners, we also propose amendments to section 10 of the *Mines Act* to enable the new *HSRC* provisions for the vetting of mining companies prior to granting permits.

**New Section**

**10 (1.02)** *Before granting a permit or authorization under section 10, the chief inspector shall take into account the owner’s past performance, if any, and deny any application if the owner’s record contains more than 2 permit violations in the last 3 years, or if the owner has failed to comply with 1 or more remedial orders issued for any exploration site, mine site, or reclamation site operating under any corporate title of the owner.*

Related Legislation		
Statute	Section	
<i>HSRC</i>	10.1.1	Background Check - Proposed Placer Mines, Gravel Pits and Quarries
<i>HSRC</i>	10.1.2	Background Check - Producing Mines

**Authority / Reference**

- Mines and Minerals Development Act*, (No 7 of 2008) Zambia, s 35(6).
- Mining Act 1992* (NSW), s 198(2).
- Quartz Mining Act*, SY 2003, c 14, s 103.
- Provincial Forest Use Regulation*, BC Reg 176/95, s 12.

## 10 (1.03)

TERMS of REFERENCE

2 3 7

### Permits - Site Profile

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We recommend re-instating the site profile requirement for waste and water management once required under section 26.1(4) of the (repealed) *Waste Management Act* which was moved to section 40 of the *Environmental Management Act*, and lost the site profile requirement for a *Mines Act* or *HSRC* permit or amendment in the transition. FMC addressed this in *HSRC* section 10.1.4(4)(d)&(e) and recommend its inclusion here in the enabling statute - the *Mines Act*.

#### New Section

- 10 (1.03)** *The chief inspector shall not approve an application for any permit or for revisions to the conditions of an existing permit unless the owner, agent or manager has provided a site profile under section 40 of the Environmental Management Act to a district inspector.*

Related Legislation		
Statute	Section	
<i>Waste Management Act</i>	26.1(4) (repealed)	Site Profile ( <i>Mines Act</i> permits)
<i>Environmental Management Act</i>	40	Site Profile

## 10 (1.04)

TERMS of REFERENCE

2 3 7

### Permits - Agreements With First Nations

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A good working relationship with First Nations affected by a mine operation as smart business is broadly recognized across the mining industry. Companies that actively work to reach and keep agreements on access, exploration, mine operations, reclamation and closure, and economic partnerships are more likely to have success. We encourage mine operators to abide by local First Nation requirements to reach consent to operate.

#### New Section

- 10.(1.04)** *No work shall proceed without a valid access agreement, exploration agreement, impact benefit agreement, or other agreement or agreements as required by First Nations where a mining project may affect those First Nations' constitutional rights or title claims to traditional territory.*

## Permits - Mandatory Security

We recommend amendments to section 10(4) of the *Mines Act* by making the requirement for a security deposit mandatory.

In keeping with the spirit of the MPRP recommendations requiring solid feasibility studies, safe and secure TSFs, and public recourse in the event of a TSF failure, we have also included new provisions setting a deadline for securities, and a preliminary site inspection to determine security amounts.

Current	Amended
10 (4) The chief inspector may, as a condition of issuing a permit under subsection (3), ...	10 (4) The chief inspector <i>shall</i> , as a condition of issuing a permit under subsection (3), ...

## Authority / Reference

RRS c E-10.2, Reg 7, s12(c).

*Quartz Mining Act*, SY 2003, c 14, s 16(1).

Colorado Revised Statutes - Title 34: Mineral Resources, s 34-32-117(1).

*California Surface Mining and Reclamation Act of 1975*, 2 Cal § 2770(a),(d), 2773.1(a).

Wash Rev Code tit 7879 § 44.087(1)(2011).

*Surface Mining Act*, N Mex Stat tit 69 c25A § 13(A)(2011).

*Papua New Guinea Mining Act 1992*, 2 150(1).

Minerallagen SFS 1991:45 (Minerals Act, Sweden), C 4, s 6.

*Mineral and Petroleum Resources Development Act*, (S Afr), No 28 of 2002, s 41(1).

## 10 (4.1) (a)(b)

### Permits - Deadline to Post Security

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It is critical that adequate security funds be available at all times during and after mining operations to protect the public interest.

#### New Section & Subsections

- 10(4.1)** (a) *the owner must post security for a permit no later than 30 days prior to commencing mining activities.*  
(b) *If the required security is not posted within the 30-day period, the chief inspector shall immediately suspend the permit.*

#### Authority / Reference

Montana Code Annotated Title 82 c 4 § 338(3)(c336(2) (2011).

## 10 (4.2)

### Permits - Preliminary Site Inspection

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Accurate assessment of environmental conditions existing on the mine site before operations start is essential to determine baseline information. This information will provide an essential foundation to assess future impacts and is protective of the public interest and the mining company's investment.

#### New Section & Subsections

- 10(4.2)** (1) *An inspector shall conduct an inspection of all areas subject to the proposed permit to assess the pre-disturbance environmental conditions prior to setting the security amount*  
(2) *The assessment under subsection (a) shall include a determination as to the probable level of difficulty in rehabilitating the site including, but not limited to*  
(a) *conservation of the topography and soils,*  
(b) *hydrological effects, and*  
(c) *re-vegetation to the natural state.*

#### Authority / Reference

S Dak CL, §45-6B-20.

Or Rev Stat vol 12 c 517 § 735(1)(2011).

*Conservation and Reclamation Regulation, Alta Reg 115/1993, s 18(1)(c).*

*Approvals Procedure Regulations, NS Reg 48/95, s 14(1)(c).*

## Permits - Emergency Amounts

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TSF risk assessment contains far too many variables across multiple fields of science to begin to address it here to the necessary depth. However, based on compelling findings by some of the world's pre-eminent mining engineers and scientists, we propose a provisional model requiring securities for emergencies based on the volume of tailings and the reliability of the chosen TSF design. Such funds would ensure some money is available for TSF failures classed as Serious or Very Serious.<sup>1</sup>

In place of a post-breach liability on the taxpayer, the provisional FMC model transfers the cost of a TSF failure to its more logical place as an up-front cost. Proponents would be able to reclaim the entire amount plus interest at the end of the mine's life, after the risk of failure has been rendered nil either through comprehensive and ongoing maintenance, conclusive monitoring and complete treatment, or decommissioning. The amount can be made immune to damages other than those caused by a Serious or Very Serious TSF failure. The source of the problem must a) come from the TSF, b) indirectly or directly harm persons, property, or the environment, and c) meet the criteria of a Serious or Very Serious TSF failure.

For a professional statistical analysis of this issue, we defer to the Bowker & Chambers 2015 paper "The Risk, Public Liability & Economics of Tailings Storage Facility Failures" which focuses on the correlation between the "exponentially increasing [Serious and Very Serious] consequence in the event of a tailings dam failure ... driven by continuously lower grades in identified resources and continuously falling real prices of most metals."<sup>2</sup>

Bowker & Chambers highlight the fact that despite improved technologies (dry-stacking, paste tailings, centreline and downstream dam design), the creation of "economic feasibility in lower grades of ore also pose[s] greater challenges for the management of mine waste and waste water. One of the manifestations of these challenges overall is a greater frequency of Serious and Very Serious tailings dam failures with significant levels of social and economic consequence, sometimes non remediable."<sup>3</sup> In other words, technological improvements and better practices alone are not preventing Serious and Very Serious TSF failures.

FMC has addressed this in several places in our proposed amendments to the *HSRC* and in our new *Mines Act* section 10(1)(0.1) where we identify the need to assess the real strength of feasibility studies to avoid the misrepresentation of lower grade ore that drives the high production of those ores into TSFs unable to cope with the demand, as was the case at Mount Polley.

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1 Lindsay Newland-Bowker, & David M Chambers, "The Risk, Public Liability & Economics of Tailings Storage Facility Failures", define Serious failures as "having a release of greater than 100,000 cubic meters and/or loss of life" and Very Serious failures as having a release of at least 1 million cubic meters, and/or a release that travelled 20 Km or more, and/or multiple deaths (generally  $\geq 20$ )" at 1.

2 Lindsay Newland-Bowker, & David M Chambers, "The Risk, Public Liability & Economics of Tailings Storage Facility Failures", Appendix 3: Documented TSF Very Serious Natural Resource Losses 1990 - 2010, July 21, 2015.

3 Ibid.

## Permits - Emergency Amounts (cont.)

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Bowker & Chambers' global prediction is "11 Very Serious failures 2010-2020 at total unfunded un-fundable public cost of \$6 billion ... [and] an additional \$1 billion for 12 Serious failures this decade." The researchers make the point that neither proponents nor any "political jurisdiction issuing permits is large enough to prefund a low frequency high consequence loss of this scale. The inevitable result is either government pays or the damages go unremediated."<sup>1</sup>

Add to this the fact that the MPRP predicts 2 failures every 10 years and six failures every 30 years in BC under the present conditions<sup>2</sup> and it is clear the situation requires a multi-level approach beyond even the seven recommendations of the MPRP.

To arrive at manageable security amounts for emergencies our calculations are determined by global average cost of TSF disaster clean-up and scaled to the risk factor determined by a) the chosen TSF design, and b) the chosen method of tailings management. For example, the amount is lowest for a TSF using filtered tailings - the highest amount for using conventional (saturated) tailings in a centreline design (FMC does not endorse the use of the upstream TSF design as per our amendment to *HSRC* section 10.1.8(d)).

While the total cost of a per-cubic metre clean-up may be difficult, and subject to the unique conditions of each spill, it is the starting point for our provisional model. First, we calculated an average amount for potential damage using the post-TSF breach statistics from 7 major TSF failures cited in Bowker-Chambers, 2015<sup>3</sup> that incurred an average cost of US\$545M (2014 dollars). The average volume of tailings spilled was 2.38Mm<sup>3</sup>. Dividing 545M by 2.38M equals \$229/m<sup>3</sup> clean-up cost.

### *The Volumetric Calculation*

The amount of damage from a breach depends on many factors, not the least of which is the quantity of tailings. The calculation of potential damage from a TSF breach must therefore have some basis in the quantity of tailings it is expected to contain.

The Hazeltine Creek area consumed under the Mount Polley tailings spill is approximately 9km long, 100m wide, and 20 m deep on average for a total volume of 18Mm<sup>3</sup>. Some estimates put the Mount Polley spill at 25Mm<sup>3</sup> and some at 14.5Mm<sup>3</sup>; therefore, 18Mm<sup>3</sup> is a fair median value for Hazeltine Creek. Add to this another 2Mm<sup>3</sup> for the tailings deposited in and around Polley Lake for a total of 20Mm<sup>3</sup>. This places the estimated conservative cost of cleaning all tailings spilled from the Mount Polley breach at \$4.58 billion by volume.

1 Lindsay Newland-Bowker, & David M Chambers, "The Risk, Public Liability & Economics of Tailings Storage Facility Failures", at 1.

2 "Report on Mount Polley Tailing Storage Facility Breach, Appendix I: BC Tailings Dam Failure Frequency and Portfolio Risk", Independent Expert Engineering Investigation and Review Panel (Government of British Columbia, Queen's Printer, 30 January, 2015) at 10.

3 Lindsay Newland-Bowker, & David M Chambers, "The Risk, Public Liability & Economics of Tailings Storage Facility Failures", Appendix 3: Documented TSF Very Serious Natural Resource Losses 1990 - 2010, July 21, 2015.

## Permits - Emergency Amounts (cont.)

An up-front premium of \$4.58B for an emergency contingency amount is, of course, impossible. Therefore, we divide this number by an average projected operational life span of the Mount Polley mine (30 years) for a figure of USD \$152.7M. This would be the one-time, up-front cost for a TSF with a maximum storage capacity of 76Mm<sup>3</sup>.<sup>1</sup>

The inferior design concept and maintenance behind the Mount Polley TSF means \$152.7M (or \$2/m<sup>3</sup> for 76Mm<sup>3</sup> storage volume) represents the high end of the scale, and would not be duplicated for a new TSF regime that prohibited the storage of conventional tailings behind an upstream dam design. Therefore, our provisional scale based on TSF design choice, and set at maximum storage volume, begins at 75% of the \$2 figure for Mount Polley, or \$1.50 for conventional tailings stored in a centreline TSF design. The \$2 figure drops another 25% (to \$1) for thickened tailings, and a further 25% (to \$.50) for paste tailings. Filtered tailings require no emergency contingency amount. The figure is further reduced within each tailings category by 25% from centreline TSF design to downstream TSF design.

### New Section & Subsections

- 10(4.3)** *The chief inspector shall, as a condition of issuing a permit under section 10(3), require that the owner, agent, manager or permittee give security in the amount determined by the table below and subject to conditions specified by the chief inspector as a separate emergency contingency amount to address emergencies, foreseen and unforeseen, from a serious or very serious tailings storage facility breach,*
- (a) available in only the following forms: cash, certified cheque, or bank draft, and*
  - (b) deposited in a qualified trust.*

CL= Centreline TSF Design  
DS = Downstream TSF Design

Emergency Contingency Amount							
Tailings Process	Conventional		Thickened		Paste		Filtered
Dam Design	CL	DS	CL	DS	CL	DS	n/a
(\$ / m <sup>3</sup> ) (Projected max. TSF storage volume)	1.50	1.13	1.00	.75	.50	.38	0

<sup>1</sup> Greg Gillstrom, “43-101 Technical Report: Mount Polley Mine 2004 Feasibility Study”, (Imperial Metals Corporation, Likely, BC, Aug 2004) indicates a projected mine throughput of 63,000 tonnes per day (“TPD”) among the 3 pits: (Wight:20k, Bell: 18k; Springer:25k) totalling 23 million tonnes (“Mt”) annually, and an overall storage volume of 76Mm<sup>3</sup>.

## Inspections

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We note in the latest available annual report from the BC chief inspector of mines (the “**2013 Report**”), that 31 geotechnical inspections were conducted in that calendar year. Ten (10) were conducted at 9 operating metal mines, 9 at operating coal mines, and the remainder (12) at other sites including advanced exploration projects and previously operating mines.<sup>1</sup>

The MPRP report indicates “there are currently 123 active tailings dams, those that contain surface water in their impoundments along with tailings”.<sup>2</sup>

We deduce, by the wording of the 2013 Report, that all inspections concerning any impoundment is left to the geotechnical team and is covered by the numbers given on page 23. Those numbers reflect the full total of all TSFs inspected in 2013. This means no mines appear as inspections in the overall 2013 Report list for surface inspections (58 Coal; 111 Exploration; 43 Industrial Minerals; and 62 Metal Mine) that might otherwise count as TSF inspections.

If we are correct in this deduction, and the only TSF impoundment inspections are those on page 23 of the 2013 Report, then a simple calculation shows 93 active impoundments in BC (or 75% of the total) did not receive any geotechnical inspections.

MPRP Provincial total	123
Geotechnical inspections in 2013	-30
(9 metal mine TSFs + 9 coal mine impoundments + 12 other)	
<hr/>	
Remainder (not receiving a geotechnical inspection)	93

Therefore, we propose amending section 15 of the *Mines Act* to include mandatory, regular geotechnical inspections for all TSFs. Some jurisdictions (as cited in our proposed amendment below) have some TSF inspection scheduling written into law, but we believe, in response to the Mount Polley breach, BC should become a world leader and mandate a more robust regime.

This amendment cuts across many of the MPRP recommendations, including #5, #6, and #7 but due to its specific nature ties in best with #5.

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<sup>1</sup> Ministry of Energy and Mines “Annual Inspection Report of the Chief Inspector of Mines, 2013” (Ministry of Energy and Mines, Queen’s Printer, 19 December, 2014) at 23.

<sup>2</sup> “Report on Mount Polley Tailing Storage Facility Breach”, Independent Expert Engineering Investigation and Review Panel (Government of British Columbia, Queen’s Printer, 30 January, 2015) at 118.

**New Subsections**

- 15 (8) *For all tailings impoundments and dams the chief inspector shall, as a condition of issuing a permit under 10(3), require that the owner, agent, manager or permittee agree, in writing, to submit to regular inspections of all impoundments and dams, and that each inspection shall include submitting to the assigned inspector all measures taken to comply with recommendations from the last annual inspection of the Engineer of Record under section 10.5.3 of the code, the last order from an inspector, or the last recommendation from the Independent Tailings Review Board, as the case may be.*
- (a) Each tailings dam in the provincial inventory, unless entirely decommissioned shall be scheduled into an annual inspection regime.*
  - (b) The chief inspector shall assign an inspector for each inspection for each dam and assign create a tailings advisory committee as needed to assist the inspectors.*
  - (c) The owner, agent, or manager shall comply with the inspection schedule.*
  - (d) Issues of non-compliance shall be subject to penalty under section 35 of this Act.*
- (9) Costs for inspections shall be the responsibility of the owner.*

**Authority / Reference**

*Mining Act, RSO 1990, c M14, s 57(4).*  
*Wash Rev Code tit 78 §44.161 (2007).*

## Compliance

We have proposed two new subsections to section 24 of the *Mines Act* to clearly define the “reasonable measures” a miner must undertake when responding to an order issued by the inspector specifically under sections 10(8)(a), 15(4)(d), 15(4.1) and 15(5) of the *Mines Act*. In addition, we propose provisions for cost recovery.

## New Subsections

- 24 (3) *In determining what constitutes reasonable measures under (1) or (2) in relation to an order made under sections 10 or 15 of this Act, the owner, agent, manager, supervisor or employee shall give first consideration to the gravity of current harms, and to the potential for continued or greater harms if the requirements of the order are not met.*
- (4) *If the owner, agent, or manager fails to fulfil the requirements of an order under sections 10 or 15, regardless of whether the owner, agent, or manager has taken all reasonable measures to do so, the chief inspector may*
- (a) *take any measures that, in the chief inspector’s opinion, are necessary to fulfil the requirements of the order, and*
  - (b) *obtain other assistance and expertise for the purpose of carrying out these measures.*
- (5) *Costs incurred by the government under (4) are recoverable by the minister as either*
- (a) *an action in debt against the party to whom the order was directed, or*
  - (b) *a charge or lien against the property of the party or parties against whom the order was directed, and*
  - (c) *in the case of a charge under (b) a charge having absolute priority over any other claims, charges, or liens against that property, notwithstanding any other law of British Columbia.*

## Authority / Reference

*Environmental Protection and Enhancement Act, RSA 2000, c E-12, s 216.*

## Enforcement of Act, Regulations, Code, Permit, or Order

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We recommend amendments to the language in section 35 of the *Mines Act* that change the language from discretionary to mandatory regarding ordering of compliance and obtaining a court order if the proponent fails to comply. We believe this will provide greater clarity to miners. Miners will ‘know where they stand’ when it comes to compliance. This aligns with MPRP recommendation #1 by ensuring the adoption of BAP and BAT for new and existing TSFs and for the stronger regulatory operations under #5.

We also propose adding subsection (3) for the mandatory posting of security as incentive for compliance similar to provisions in the statutes of Newfoundland and Labrador.

### Amended & New Subsections

- 35 (1) If an inspector finds that a mine is not being operated in accordance with an order under section 15 or a provision of the Act, the regulations, the code or a permit, the inspector *shall* order the owner, agent, manager, permittee or person apparently in charge in, on or about a mine to comply with the order or provision.
- (2) If a person fails or refuses to comply with an order of an inspector under subsection (1) of this section or under section 15, the inspector *shall* apply to the Supreme Court for an order directing the person to comply.
- (3) *Every order for compliance shall require security deposit of \$1,000,000 for minor offences and \$5,000,000 for major offences.*
- (4) *Securities posted under (4) shall be returned upon full compliance with the order.*

### Authority / Reference

*Environmental Protection Act*, SNL 2002, c E-14.2, ss 77, 99.

# **APPENDICES**

## Best Available Technology

### Tailings Management

In the words of the MPRP:

“From the beginning, dam raising proceeded incrementally, one year at a time, driven by tailings storage requirements for only the next year ahead. More reactive than anticipatory, there was little in the way of long-term planning or execution.

“This was most clearly displayed by the absence of an adequate water balance or water treatment strategy, and the overtopping failure that nearly resulted. Moreover, the related absence of a well-developed tailings beach violated the fundamental premise of the design as a tailings dam, not a water-storage dam.”<sup>1</sup>

We focus here on the issues of water balance and water management in tailings which includes a detailed analysis of tailings components and production considerations that affect tailings chemistry and composition.

The chosen method for tailings management and storage for almost all mines in BC has been the surface impoundment. These are man-made walls requiring heavy construction methods and costs, continual maintenance, and “selection of the embankment type ... based on the specific characteristics of each mine, mill, tailing grind, climate, seismicity and topography and other factors”<sup>2</sup> that are meant to retain a heavily saturated and constantly changing mixture.

These conventional impoundments also “fall short in the face of space constraints.”<sup>3</sup> Also, “environmental concerns related to TSFs can be minimised by favourable site geologic conditions and engineered controls or by lining the impoundment.”<sup>4</sup> The issue of the inadequate geological conditions forms the basis of the MPRP report, and the Mount Polley mine does not utilize a liner.

Given the inferior characteristics of Conventional Tailings Disposal (CTD) using impoundments, the only factor justifying their use is low cost. Mines with a high level of production use the CTD as the default storage facility in order to make more money. However, as is clearly evident at Mount Polley, this can backfire a hundred-fold when it is done poorly. This is especially disconcerting when we consider the remaining CTD facilities in BC and the fact new ones are still being built as the first and only choice in tailings storage technology.

Given the findings of the MPRP report outlining the flaws of the CTD used at Mount Polley, and considering the Code Review Committee’s reception for the Best Available Technology for tailings storage, we present the following tables (Table 1.1, 1.2, 1.3 & 1.4), break down the advantages and disadvantages of Alternative Tailings Disposal (ATD) methods, and analyse tailings and Best Available Technologies.

Note that different methods may be required for different climate and topography. BC has several climatic zones and a dynamic topography, and yet the same TSF technology has been used, and continues to be used across all climates and topography. We recommend ATD technology as the mandatory first choice in tailing storage facility technology, and the onus of proof for using CTD be placed on the miner.

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1 “Report on Mount Polley Tailing Storage Facility Breach”, Independent Expert Engineering Investigation and Review Panel (Government of British Columbia, Queen’s Printer, 30 January, 2015) at 75.

2 Andrew H. Watson, “Alternative Tailing Disposal - fact and fiction” [2010] *Paste Tailings Management*, International Mining Supplement, at 3.

3 Ibid.

4 Ibid.

**Table 1.1 - Alternative Tailings Disposal: BAT vs. Conventional Tailings Disposal**

TABLE 1.1	<b>Table 1.1 - Alternative Tailings Disposal: BAT vs. Conventional Tailings Disposal</b>							
Type	Name	Overall Description	Specifics	Specific Advantages by Type	Best Application	Disadvantages		
<b>Best Available Technology</b>	Alternative Tailings Disposal (ATD)	Filtered Tailings Disposal (de-watered)	Smaller tailings disposal footprint Smaller dam engineering Lower water consumption Optimizes water recovery	>85 solids by weight Uses vacuum or confining pressure Transported by truck or conveyor Requires earth moving equipment at dump	Saves most water Possible in a variety of terrains	Mines with severe lack of water Mines with limited space With an available inexpensive energy supply source	Alternative tailings disposal (ATD) more difficult in wet climates  ATD requires more energy to de-water and transport	Co-ordination of the material handling, spreading and compaction in a high production rate mine is more complex  'dry-stacking' creates more dust
		Paste Disposal	Negligible bleed water release No critical velocity required to avoid settling in transportation to discharge	70 - 85 % solids by weight Best in underground backfill	2nd-best water savings	Successful history of use in underground backfill Requires min. 15% particles less than 2 micron Paste thickeners and pumps		Maintaining uniform deposition slopes on paste facilities challenging because of changes in ore characteristics, tailing gradations and % solids
		Thickened Tailings Disposal	Reduced closure cost Reduced operating risk liability Reduction in contamination leachate potential Potential for no impervious liner and monitoring systems	65 - 72 % solids by weight Uses high-density or deep-cone thickeners	Marginal water savings over CTD Requires small to no embankment Does not segregate Beach slope remains uniform	Flat terrain		More delivery pipeline maintenance  Requires maximization of drying and consolidation
<b>Budget Technology</b>	Conventional Tailings Disposal (CTD)	Conventional Tailings Disposal	Cheap Easy to transport	30 - 55% solids by weight Releases significant water Uses cycloning or spigoting for deposition		Last alternative in extreme wet climates	Requires dams, embankments, and surface impoundments	

From: Andrew H. Watson, "Alternative Tailing Disposal - fact and fiction" [2010] Paste Tailings Management, International Mining Supplement, at 3.

We propose the following two Tables<sup>1</sup> from the European Commission, *Reference Document on Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities 2009* for consideration as Best Applicable Practices in decision-making and as choices for Best Available Technology in processing and production.

Tailings characteristics influence their behaviour. In combination with the site location, these factors determine to a large extent the type of management facility. Some of the major factors contributing to the success or failure of a TSF are:

- Chemical composition
- Physical composition and stability (static and seismic loading)
- Behaviour under pressure and consolidation rates
- Erosion stability (wind and water)
- Settling, drying time, and densification behaviour after deposition
- Hard pan behaviour (crust formation on top of the tailings)

<b>Table 1.2.1 - Tailings characteristics: Composition</b>									
<b>TABLE 1.2.1</b>									
<b>Tailings behaviour</b>	<b>Grain size distrib.</b>	<b>Fines</b>	<b>Specific surface</b>	<b>% solids</b>	<b>Reagents</b>	<b>pH</b>	<b>ARD influence</b>	<b>Surface properties</b>	<b>Particle shape</b>
Permeability	X	X	X	-	-	-	-	X	X
Plasticity	X	X	X	-	-	-	-	-	X
Shear strength	X	X	X	-	-	-	-	X	X
Compressibility	X	X	X	-	-	-	-	X	X
Tendency to liquefaction	X	X	X	X	-	-	-	X	X
Chemical properties	-	X1	X1		X	X	X	X	X
Density (in-place and relative)	X	X	X	-	-	-	-	X	X
Consolidation	X	X	X	-	-	-	-	X	X
Dusting	X	X	-	X	-	-	-	-	-
Toxicity of discharge	X2	-	X2		X3	X	X	X	-
Tailings delivery	X	X	-	X	-	-	X	-	-
Deposition	X	X	-	X	-	-	X	-	-
Free water management	X	X	-	X	X3	X	X	-	-
Seepage flow	X	X	X	X	-	-	-	X	X
Long-term safety	X	X	X	-	-	-	-	X	X
ARD management	X	X	X	-	-	X	X	X	-
Emissions to air	X	X	-	X	-		-	-	-
Emissions to water	X	X	-	X	X3	X	X	X	-
Emissions to land	X	X	-	X	X3	-	X	-	-
Effluent treatment	X	X	X	X	X3	X	X	X	X
Dam construction	X	X	X	X	X3	X	X	X	X
Monitoring	-	X	-	-	X3	X	X	-	-
Closure and after-care	X	X	X	X	X3	X	X	X	X
1) because of increased/altered availability 2) if ARD producing tailings and exposed to the atmosphere 3) not necessarily valid if tailings water is removed (i.e. by filtration) prior to tailings discharge									

<sup>1</sup> European Commission, *Reference Document on Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities*, January 2009, at 89.

TABLE 1.2.2		Table 1.2.2 - Tailings characteristics: Processing							
Process Step	Grain size distrib.	Generation of Fines	Specific surface	% solids	Reagents	pH	ARD influence	Surface properties	Particle shape
Comminution	X	X1	X	X2	-	-	X	X	X
Screening	X	X3	-	-	-	-	-	-	-
Classification	X	X	-	X	-	-	X	-	-
Gravity conc.	-	-	-	X	-	-	X	-	-
Flotation	-	-	-	X4	X5	X6	X	X	-
Magnetic sep.	-	-	-	-	7	-	X	-	-
Electr. sep.	-	-	-	-	X	-	X	X	-
Sorting	-	-	-	-	-	-	X	-	-
Leaching	-	-	-	X	X	X	-	X	-
Thickening	-	-	-	X8	X9	-	-	X	-
Filtering	-	-	-	X	X	X10	-	X	-

1) e.g. agitated mill generates more fines than ball mill  
2) crushing dry, tumbling mills and agitated mills wet process  
3) excessive screening can lead to generation of fines  
4) flotation is a wet process with about 30 - 40 % solids in metal ore processing and 5 - 15 % solids in coal processing, in most cases water will have to be added  
5) Incl. collector agents (ionising or non), frother agents, regulators/ modifiers (activators, depressants, and pH modifiers which have different uses and effects - the most significant is the pH modifier which will have an important effect on most processes) and flocculants.  
6) raised or lowered  
7) usually no reagents, however, for fines sometimes dispersion agents are used for deagglomeration  
8) obviously % solids are reduced by thickening  
9) often use of flocculants (see 2.3.2 for details)  
10) e.g. by using flocculants such as aluminium sulphate or lime, which change pH

<b>Table 1.3.1 - BAT Options: Tailings Processing</b>			
<b>ITEM</b>	<b>ADVANTAGE</b>	<b>DISADVANTAGES</b>	<b>REPLACES</b>
Eductor feed agitation system <sup>1</sup>  (FLSmidth (or equivalent) E-Disc Filtration)	<ul style="list-style-type: none"> <li>BAT for paste processing</li> <li>Minimized maintenance</li> <li>More compact vs. slurry paddle system</li> <li>Lower installation cost</li> <li>Independent feed head replacement</li> <li>Custom feed flow for different processes</li> <li>Planetary shaft with work drive &amp; chain drive options</li> <li>Extra air-sweep feature prior to snap-blow for full water evacuation</li> <li>Vaccum-retract to retain filter media prior to snap-blow</li> <li>Highest available cake dry zone</li> <li>Up to 3x less cost over 15 yrs. than paddle system,; 2 x less than (Large Diameter Disc Filtration) LDDF</li> </ul>		Slurry paddle agitation system for tailings de-watering
Sonar bed level transmitter <sup>2</sup>	<ul style="list-style-type: none"> <li>Applies paste thickeners at optimum levels</li> <li>Optimization of underflow density</li> <li>Relays real-time process settling conditions</li> <li>Reduces overall chemical use &amp; cost</li> <li>Reduces electrical costs</li> <li>Optional auto-control or operator control of flocculant closing</li> <li>Maintains consistent density of paste thickener feed to underflow pumps</li> <li>Minimizes transport of water to and from tailings dam</li> <li>More expensive coagulant additions use same control as flocculants</li> <li>Coagulant flow starts only a t 100% flocculant rate &amp; rising interface layer</li> <li>Will cascade any internal turbidity transmitters into control loop for added water clarity</li> </ul>	<p>Purging of lines using tailings water on paste thickener shutdown.</p> <p>Swap transducers for different results</p>	<p>Manual control of paste thickeners</p> <p>Separate rake torque &amp; bed pressure operations for determining underflow pump rate</p>
Fused-cast basalt piping <sup>3</sup>	<ul style="list-style-type: none"> <li>Significant corrosion reduction</li> <li>Considerable reduction in head loss</li> <li>Avoids incrustation</li> <li>Cu, Au, Zn, Coal + applications</li> </ul>	Principal advantage for Au, Zn, Diamond	Duplex steel pipes
Solid Pumps <sup>4</sup>	<ul style="list-style-type: none"> <li>Pressure Constant Flow option</li> <li>Modular = reduced operating costs</li> <li>Replacement: parts only (not entire pump head)</li> <li>Seat valves in pump head prevent flow-back during pressure/suction transitions</li> <li>Sustains 150 bar pressure under continuous operation</li> <li>Effective output of 250m<sup>3</sup>/h</li> <li>Easy multi-cylinder delivery modification for increased output</li> <li>Individual pumps upgradeable</li> </ul>		

1 Steve Ware, "Next generation disc filtration", Paste Tailings Management, International Mining Supplement, 2010, at 7.

2 "Maximizing paste thickener efficiency and performance", Paste Tailings Management, International Mining Supplement, 2010, at 10.

3 Joe Accetta, "Piping the paste", Paste Tailings Management, International Mining Supplement, 2010, at 14.

4 "High pressure and density pumping", Paste Tailings Management, International Mining Supplement, 2010, at 16.

<b>TABLE 1.3.2</b>	<b>Table 1.3.2 - BAT Options: TSF Design &amp; Monitoring</b>	
<b>ITEM</b>	<b>ADVANTAGE</b>	<b>DISADVANTAGES</b>
ShapeAccelArray*	<ul style="list-style-type: none"> <li>Instantaneous and continuous inclinometer data stream</li> <li>Cheaper than conventional inclinometers</li> </ul>	Conventional inclinometer
Automatic Deformation Monitoring System	Interacting, interrelated, or interdependent software and hardware elements forming a complex whole for deformation monitoring that, once set up, does not require human input to function.	Individual elements read by humans
NSWS Testing Machine, an in-situ ground survey device	Lightweight and compact, portable, continuous control of the load, enhanced resolution to measure super soft zones, simultaneously measurement of penetration time while loading, can detect ground self-subsidence (hollow and loosening), and can measure the direction of tilt on the surface and the slope on the ground.	Standard penetration test
Kinetic testing for acid mine drainage potential	More accurate for predicting future acid mine drainage	Passive testing
'Downstream' construction model of tailings dams	Most stable in seismic events, water imbalance situations, and unforeseen foundation anomalies	Upstream and centre-line construction methods
Alternate access for potential failure scenario locations	Predict and design alternate access points around the TSF	

<b>TABLE 1.3.3</b>	<b>Table 1.3.3 - BAT Options: Environmental</b>	
<b>ITEM</b>	<b>ADVANTAGE</b>	<b>REPLACES</b>
Native plant cover	Best adaptability to environment. Low nitrogen fertilizer requirement.	Conventional roadside mixtures of grasses and legumes of European origin.
Remote pH monitoring	<ul style="list-style-type: none"> <li>Low-voltage / DC / indirect solar</li> <li>Web-interface can generate multi-level periods</li> <li>Use/password protected</li> <li>Alarm-text messages &amp; paging options for alerts</li> </ul>	Physical monitoring
Geosynthetic liner	<p>The use of liners to contain acidic and metal laden leachate from tailings storage facilities is problematic because the liner will eventually fail, which can lead to surface and groundwater contamination. The integrity of a geosynthetic liner will not outlast the perpetual life of a TSF. A TSF should be sited and constructed so that contaminant release is not possible, even over hundreds of years.</p> <p>The correct siting of a mine is the key to preventing future contamination. along with perpetual water monitoring, and, if necessary, perpetual water treatment.</p>	
Microbes	used for: processing ore (breaking down sulfide prior to cyanidation), treatment of ARD, bioleaching Treatment of ARD, recovery of valuable minerals. Tailings less likely to contain/form acid, or leach heavy metals into surrounding environment.	
ChemSulfide™	Treats acid mine drainage. End product is valuable mineral concentrate, rather than heavy-metal laden sludge Effluent meets high standards	