

Spring 2015

DANGEROUS DAMS MOUNT POLLEY MINE REPORT SHOWS INHERENT RISKS OF WATERED TAILINGS IMPOUNDMENTS

Transboundary Taku, Iskut-Stikine, and Unuk Rivers at Risk of Worse Disaster

The Mount Polley mine in south central British Columbia had a tailings impoundment intended to hold mine wastes for centuries. It didn't last 20 years. When the Mount Polley tailings dam failed on August 4, 2014, 25 million cubic metres¹ of tailings waste, wastewater, and dam materials surged into creeks and lakes in the upper Fraser River watershed, threatening drinking water and one of the province's most productive salmon watersheds. On January 30, 2015, an Independent Expert Engineering Investigation and Review Panel delivered a Final Report on its investigation into the cause of the failure, with recommendations

to avoid similar catastrophes. The report found that unless significant changes are made to the way tailings dams in B.C. are designed, built, and managed, failures will happen again, to the tune of two dam failures on average every ten years.²

"If the inventory of active tailings dams in the province remains unchanged, and performance in the future reflects that in the past, then on average there will be two failures every 10 years and six every 30. In the face of these prospects, the panel firmly rejects any notion that business as usual can continue."

> REPORT ON MOUNT POLLEY TAILINGS STORAGE FACILITY BREACH



Mount Polley Tailings Dam Failure. Photo: Cariboo Regional District

1. Report Finds "Intrinsic Hazards" in Watered Tailings Facilities

The Panel determined that watered tailings facilities, which store mine waste under water behind rock and earth dams, are inherently risky. The Panel called these types of facilities, "tailings technology that has not fundamentally changed in the past hundred years", and the report's major recommendation is to stop using this outdated technology.

The Panel's analysis of the risks of watered tailings technology highlights the dangers of proposed B.C. mines such as Kerr-Sulphurets-Mitchell (KSM), Red Chris, and Tulsequah Chief in the B.C. – Southeast Alaska transboundary region. These three mines, plus several others now being considered, are in close proximity to headwaters of major salmon producing rivers, and an accident at any of them could be disastrous.

The recommendations are extremely significant and must be fully implemented as a package, without picking and choosing.

"Mount Polley has shown the intrinsic hazards associated with dual-purpose impoundments storing both water and tailings."

REPORT ON MOUNT POLLEY TAILINGS STORAGE FACILITY BREACH

TRANSBOUNDARY WATERSHED CONSERVATION

"Protecting Alaska – British Columbia transboundary watersheds since 1999, with staff and associates in Alaska, British Columbia and Washington."





2. The Cause of the Mount Polley Dam Failure

The panel of three engineers found the Mount Polley tailings dam failed when a layer of clay-like glacial material gave way under a dam built too high and too steep. The design flaw was not discovered during dam design or permitting. One panelist compared the dam to a "loaded gun" and said that as the height was raised and the slope steepened, this was "like pulling the trigger," causing the collapse of the dam. The report identified multiple problems, including a failure to discover the weak soil layer, "overtopping" due to holding too much water, "ad hoc" raising of the dam, internal erosion of the dam walls, and missing sensors. "Clearly, multiple failure modes were in progress," said the report. "There was little in the way of long-term planning or execution."



Damage to Hazeltine Creek from Mount Polley dam failure. Photo: Gordon Klco



Mount Polley tailings dam debris on Quesnel Lake. Photo: Gordon Klco

3. Recommendations from the Report

The panel noted there are 123 mines with watered tailings facilities in B.C. Several more proposed mines, including KSM, Red Chris, and Tulsequah Chief, also call for watered tailings facilities. A dam failure at KSM or Red Chris in particular could cause dramatically worse damage than Mount Polley due to the presence of acid-generating tailings. As the report noted: "although the tailings released at Mount Polley were not highly reactive, it is sobering to contemplate the chemical effects had they been.... The Panel firmly rejects any notion that business as usual can continue."

Aiming at a goal of zero tailings dam failures in B.C., the independent engineers outlined the following recommendations:

- Best available technologies, such as filtered and dewatered tailings (dry stack), should be implemented for new tailings facilities at existing and proposed mines.
- Existing tailings facilities should rely on best practices for the remaining active life of the mine, including "a detailed evaluation of all potential failure modes."
- Future mine permitting must be tightened to include a detailed evaluation of risk management factors for all potential mine failures.
- Permit applications should be based on a detailed cost-benefit analysis of the use of best available tailings technologies, and cost should not pre-empt safety.
- Independent review boards must be appointed to provide third-party advice on the design, construction, operation and closure of tailings dams.
- B.C.'s regulatory system needs to be strengthened, with an emphasis on protecting public safety. Improved guidelines tailored to the conditions encountered with tailings dams in B.C. must be developed.



4. Implications for B.C. Mining

While the independent panel focused on the technical and engineering reasons for the Mount Polley dam failure, its report has significant implications beyond the specific cause of that particular disaster. For tailings dams in B.C., the panel advocated a "zero failure rate." This is especially important in B.C. because the climate is wet, and mines are often built in remote and difficult to access locations. Some mine facilities are built atop potentially unstable glacial till. Acid mine drainage is also a common problem, often near fish bearing waters. In this context, the panel said the only way to achieve the goal of zero failures is to replace watered tailings facilities with better technologies such as dry stack tailings. "Safety attributes should be evaluated separately from economic considerations," said the report, "and cost should not be the determining factor."



Red Chris tailings impoundment under construction, 2014. Photo: Clay Frick

Even with dewatered tailings and dry stack storage, B.C. mines will likely have acid mine drainage issues from snow, rain, and groundwater intrusion of the tailings. Replacing watered tailings dams means not only constructing alternative tailings impoundments, but likely also new or bigger water treatment facilities, and geo-engineered covers to sequester dry stack tailings from oxygen if they are acid generating. All of this could dramatically alter the cost of mine construction in B.C.

"We urge the province of British Columbia not to cherrypick the recommendations. This is not a smorgasbord."

GRAND CHIEF STEWART PHILLIP, UNION OF B.C. INDIAN CHIEFS⁵ Further implications of the report are a need for a new mechanism to cover the costs of potential accidents and to compensate injured parties.³ The Mount Polley failure demonstrated that insurance policies for tailings dam accidents are limited or non-existent and reclamation bonding does not cover accidents. Risk assessments need to be improved, because, like Mount Polley, proposed mines in B.C. such as KSM and Tulsequah Chief in the transboundary region have little to no analysis of potential downstream effects, or contingency plans, in the case of failure.⁴

5. B.C. Commitment in Doubt

B.C.'s Minister of Energy and Mines, Bill Bennett, has said the province "will implement all of these recommendations [in the report]."⁶ However, he did not say when, and his caveat of "where appropriate"⁷ has spurred far more concern than reassurance. Bennett then told an industry group, "We are not going to demand dry-stack tailings for every new mine in the province, [but] we are going to come up with new standards and protocols for [tailings dams] that will move us towards less water generally."⁸

In point of fact, B.C. gave Imperial Metals – owner of the Mount Polley mine – an interim permit to open the much larger Red Chris mine in the Iskut-Stikine watershed in northwest B.C., just three days after the release of the Mount



Polley report. The Red Chris tailings facility has a similar watered tailings dam design to Mount Polley (which failed in less than twenty years), and is also built atop potentially unstable glacial till.

In October 2014, an independent expert review of the Red Chris tailings dam design and construction found numerous concerns⁹ similar to those raised about Mount Polley. In addition, the Red Chris tailings will be acidic, the dam will be significantly higher, and will need to hold back a much larger volume of tailings. "Any failure of the Red Chris impoundment will have a much more significant environmental impact than the Mount Polley failure," said the reviewers. Despite these concerns, no design changes have been required for the Red Chris tailings facility.¹⁰



DANGEROUS DAMS • MOUNT POLLEY MINE REPORT SHOWS INHERENT RISKS OF WATERED TAILINGS IMPOUNDMENTS Transboundary Taku, Iskut-Stikine, and Unuk Rivers at Risk of Worse Disaster

6. Transboundary Mines Still Risky

In the transboundary Unuk watershed, waste rock dams at the proposed KSM mine – one of the world's largest proposed open pit mine projects – could sit upon potentially unstable glacial foundations. Despite the downstream risks to both the Unuk, a major chinook and eulachon river, and the Nass River, B.C.'s third largest salmon producer, KSM received both a Provincial and a Federal Environmental Assessment Certificate. "The Mount Polley disaster is a stark example of B.C.'s stewardship of a project that the government and the developer claimed was safe. We can't let a similar accident taint the rivers of the transboundary region along the border between northwest B.C. and Southeast Alaska."

MARK JENSEN, MAYOR OF PETERSBURG BOROUGH, ALASKA¹²

Calls for a Panel Review that would have provided a more comprehensive assessment of KSM's tailings impoundment design, and a closer look at the proposed mine's unprecedented water treatment plans, were rejected by the Canadian government just two months before the release of the Mount Polley report.¹¹

In the Taku watershed, the proposed Tulsequah Chief mine would have a watered tailings facility immediately above some of the Taku's premier salmon habitat. Other proposed mines in the Iskut-Stikine watershed, such as Schaft Creek and Galore Creek, also plan watered tailings facilities much larger than Mount Polley's.¹³ Given the risks posed by this outdated technology, significant design changes are needed at these mines to make them safer.

As Professor Calvin Sandborn at the University of Victoria Environmental Law Centre has said, "we simply cannot afford to have loaded guns on major watersheds throughout the province, especially ones that could permanently destroy fisheries."¹⁴ While the Mount Polley report recommendations are a step in the right direction, they won't fix all problems at B.C. mines, and may not be implemented in full. Already B.C. indicated that independent review boards will be mandatory for dams, but the boards' recommendations may be secret and not required to be reported to government or the public.¹⁵

Even if the recommendations are followed, habitat destruction, acid mine drainage, and other threats from B.C. mining would still pose major risks to water quality and fish in the transboundary watersheds. Regardless of if or how the Mount Polley report recommendations are followed, some mines simply pose too many risks to water and fish. B.C.'s plans to transform the transboundary region into a major mining district have the potential for long-term effects on the outstanding ecological and economic values embraced by the Taku, Iskut-Stikine and Unuk watersheds. A mechanism to analyze these potential effects and recommend ways to avoid them is vital prior to additional industrial development in the transboundary region. The B.C. mine permitting process is inadequate for this task. An International Joint Commission, which can be established under the auspices of the Boundary Waters Treaty¹⁶, provides a much better forum to help ensure the continued productivity of these unique and spectacularly productive international watersheds.

Mount Polley Independent Expert Investigation and Review Report: https://www.mountpolleyreviewpanel.ca/final-report

Rivers Without Borders: http://riverswithoutborders.org

Wild Border Watersheds: http://wildborderwatersheds.org

- 1 Mount Polley Updates, Imperial Metals. http://www.imperialmetals.com/s/Mt_ Polley_Update.asp?ReportID=671041
- 2 "Independent Expert Engineering Investigation and Review Mount Polley Tailings Storage Facility Breach". https://www. mountpolleyreviewpanel.ca
- 3 Mount Polley investigation: Whitewash follows tailings flood – culprits let off the hook, The Common Sense Canadian. http:// commonsensecanadian.ca/mountpolley-investigation-whitewash-followstailings-flood-culprits-let-off-hook/
- 4 Mount Polley highlights risk of Red Chris, KSM tailings dam failures, The Common Sense Canadian. http:// commonsensecanadian.ca/mountpolley-highlights-risk-red-chris-ksmtailings-dam-failures/

- 5 Mount Polley: First Nations urge B.C. not to cherry-pick from mine report advice, CBC News. http://www.cbc.ca/m/touch/canada/ britishcolumbia/story/1.2943862
- 6 Update on independent panel recommendations. Ministry of Energy and Mines and Responsible for Core Review. http://www2.news.gov. bc.ca/news_releases_2013-2017/2015MEM0005-000158.htm
- 7 My Turn: Mining disasters must end with Mount Polley, Juneau Empire. http:// juneauempire.com/opinion/2015-02-24/ my-turn-mining-disasters-must-end-mountpolley
 PDAC 2015: B.C. usure reserved encount-
- 8 PDAC 2015: B.C. vows measured response to Mount Polley mining waste disaster, Financial Post. http://business.financialpost. com/2015/03/02/pdac-2015-b-c-vowsmeasured-response-to-mount-polleymining-waste-disaster/ 4

- 9 Third-party review of Red Chris mine tailings dam design finds concerns, Vancouver Sun. http://www.vancouversun. com/technology/Third+party+review+Ch ris+mine+tailings+design+finds+concern s/10392164/story.html
- 10 Northwestern B.C. mine receives discharge permit, Terrace Standard. http://www. terracestandard.com/news/290969391.html
- 11 Canada OKs giant British Columbia gold mine over Southeast Alaska fears, Alaska Dispatch News. http://www.adn.com/ article/20141219/canada-oks-giant-britishcolumbia-gold-mine-over-southeast-alaskafears
- 12 Design failure caused Mount Polley tailings breach, expert panel concludes, The Globe and Mail. http://www.theglobeandmail.com/ news/british-columbia/design-failure-causedmount-polley-tailings-breach-expert-panelconcludes/article22719967/

- 13 Wild Border Watersheds, http://wildborderwatersheds.org
- 14 Opinion: Bennett must not ignore expert panel, Vancouver Sun. http://www.vancouversun.com/business/0 pinion+Bennet+must+ignore+expert+pane I/10812104/story.html
- 15 Review boards will study B.C. tailings dams, but reports may be secret, Vancouver Sun.
 - http://www.vancouversun.com/Review+boar ds+will+study+tailings+dams+reports+secre t/10816640/story.html#__federated=1
- 16 United Tribal Transboundary Mining Work Group 'outraged,' insulted by Red Chris opening in Stikine watershed, Juneau Empire. http://juneauempire. com/outdoors/2015-02-13/united-tribaltransboundary-mining-work-groupoutraged-insulted-red-chris