



CLEANING UP BC'S DIRTY MINING INDUSTRY



MINE POLLUTION LOOMS OVER BC'S RIVERS AND SALMON



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When the tailings pond dam breached at BC's Mount Polley Mine in August 2014, it unleashed a torrent of mine waste and water. Much of this ended up pouring into one of the province's most important salmon nurseries – Quesnel Lake.

An estimated 8 million cubic metres of solid mine tailings (enough to fill well over a half million 25-tonne dump trucks) were mixed in with the slurry that spewed into the lake.¹

Materials that make up Mount Polley mine waste include arsenic, cobalt, copper, lead, manganese, mercury, nickel, phosphorous and vanadium.²

The cost to mine owner Imperial Metals to date has been substantial – \$70 million in rehabilitation, as well as a year of lost production and a huge drop in the stock market following news of the collapse.³ But not all losses can be added up in dollars.

The Quesnel Lake watershed supports an important component of the Fraser River sockeye salmon run. Fisheries managers are holding their breath, waiting to see what long-term impacts the Mount Polley disaster will have on the run.

First Nation community members who fish for salmon downstream of the spill are concerned about potential health impacts on the salmon, as well as on the people who eat them.⁴

Not surprisingly, the Mount Polley Mine disaster – the largest of its kind in Canadian history – has unleashed a torrent of widespread public concern about the increasing environmental

risks and health impacts from BC's mining industry.

Tailings storage facilities like the one at Mount Polley have become widespread throughout the province.

TAILINGS POND a.k.a Tailings Storage Facility (TSF)

These huge storage facilities are the result of the controversial practice of mixing mine waste (tailings) with large volumes of water, and holding it behind earthen dams.

BC now has 98 permitted tailings ponds at 60 operating and closed mines.⁵

Many of them are the size of a lake – multiple kilometres across.

At the Highland Valley Copper mine located between Logan Lake and Ashcroft, the tailings pond is almost 10 kilometres in length, with a massive earthen dam at either end.⁶ It sits perched above the Thompson River, a major tributary of the Fraser River and an important salmon habitat in its own right.

Out of concern for the danger of another mine dam bursting, managers

have been looking at reducing the pressure on mine dams. That sounds like good news – but it isn't. There is now an increase in schemes that involve dumping mine wastewater into downstream rivers, lakes and creeks, which are often important salmon habitat.

For example, the Gibraltar Mine, located near Williams Lake, was recently issued a temporary permit to increase the release of mine tailings pond water up to 5.4 million cubic metres a year directly into the Fraser River.⁷

And even at the now-reopened Mount Polley Mine, a temporary permit has been issued to release treated mine effluent into Quesnel Lake – at a rate that could fill an Olympic swimming pool in about 2.5 hours.⁸

Many now believe that the province has reached an emergency situation. At stake are the health and well being of the region's people and world famous salmon runs.

Read on to find out how we can work together to clean up BC's dirty mining industry.



Photos left to right: Hazeltine Creek, post-Mount Polley mine spill (ClayoquotAction.org), wild sockeye salmon (Dale Sanders).

Photo top: Highland Valley Copper Mine west of Kamloops, BC (Jeremy Sean Williams).

MINE DAMS: ACCIDENTS WAITING TO HAPPEN

Modern open-pit mining involves the excavation of large amounts of waste rock in order to extract the desired mineral ore, such as copper or gold. The ore is then crushed into finely ground tailings for processing, using various chemicals, water and separating processes to extract the final product.

In Canada, the average grades of mined copper are under one per cent. This means that for every tonne of copper extracted, over 99 tonnes of waste material (made up of finely ground and often toxic "tailings") must also be removed.

Waste material from a mine may contain acid-producing sulphides, heavy metals or other contaminants. Therefore, after it is removed it must be properly stored to avoid polluting the surrounding environment. This waste material, and the exposed bedrock walls from which it is excavated, is the source of most of the heavy metals pollution caused by mining in BC.

If improperly secured, mine waste contaminants can leach out into surface and groundwater causing serious pollution that can last for generations.

The best way to prevent acid mine drainage is to keep the potentially acid-producing material from mixing with open air. Once air hits this type of rock and the reactions begin, acid mine drainage is very difficult and expensive to mitigate. Affected communities are faced with the long-term, high cost of treating mine drainage water, effluent discharge and the disposal of treatment sludge – all of it harmful to fish.

The least expensive strategy for preventing acid mine drainage is to submerge the waste rock or tailings under water in a tailings "lake" held back by dams, to prevent exposure to oxygen and to provide water for mine operations. This strategy for avoiding acid drainage depends on keeping the water cover and dam structures intact... forever.⁹

As major mine dam failures become more common worldwide, people are seeing these massive structures as accidents waiting to happen. In BC, there is an increased call for the industry to clean up its act and store mine waste using much less water, which reduces the risk of a catastrophic failure or leakage of harmful materials.

TAILINGS DAM FAILURES ON THE RISE

A lot of things in modern society are getting safer. From seatbelts and airbags in cars to safer aircraft design and safer home appliances, disaster rates are going down with each passing year.

Sadly, that's not the case when it comes to mine tailings dams. In fact, just the opposite is occurring – **large mine dams are getting more accident prone.**

A recent report has shown that the rate of serious tailings dam failures is increasing. Half of serious tailings dam failures in the last 70 years occurred in the 20 years between 1990 and 2009.

The reason for this is that tailings dams are getting bigger – standing taller than previous dams and holding back a larger amount of tailings mixed with water.

The average cost of each tailings dam that fails is now well over \$500 million.

Mining companies often cannot afford, or cannot get insurance to cover the costs of tailings dam failures. As a result, the economic and ecological impacts could be permanent and non-recoverable, or the recovery – if ever possible – is funded by taxpayers.¹⁰

ACID MINE DRAINAGE

Metals are often found in rock with sulphide minerals. When the sulphides in the rock are excavated and exposed to water and air during mining, they form sulphuric acid. The resulting acidic water can dissolve other harmful metals in the surrounding rock. If not controlled, the acid mine drainage may run off into streams or rivers or leach into groundwater.¹¹

NEW MINES, OLD TECHNOLOGY

Even though a BC government report produced in the wake of the Mount Polley disaster recommended moving away from mixing mine waste with water behind huge earthen dams¹², the problem appears to be getting worse – not better. Mine proponents may claim they have considered safer options for storing tailings, but then choose to build a water-covered tailings holding area behind a dam because it's cheaper to do so. New mines, like the Red Chris Mine in northern BC, are being built with the same old tailings dam technology.¹³

SIGNIFICANT BC METAL MINES

Status

- Operating
- ◆ Under Construction
- ▲ Care & Maintenance (temporarily closed)
- Closed
- * Proposed - Permitting / Environmental Assessment
- Exploration
- ✘ Rejected



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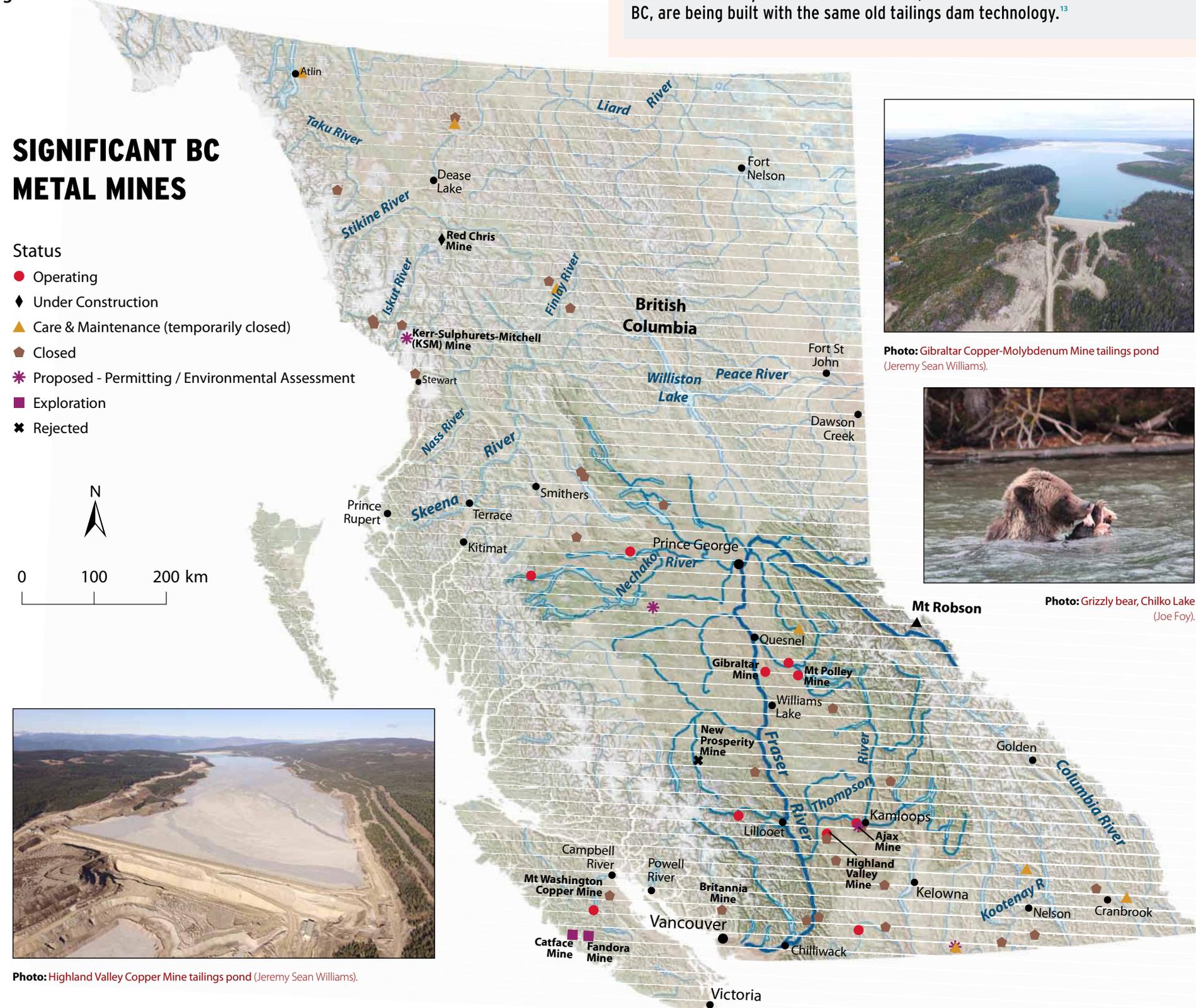


Photo: Gibraltar Copper-Molybdenum Mine tailings pond (Jeremy Sean Williams).



Photo: Grizzly bear, Chilko Lake (Joe Foy).



Photo: Highland Valley Copper Mine tailings pond (Jeremy Sean Williams).

SALMON AREN'T FANS OF HEAVY METAL

Acid mine drainage occurs when sulphur-bearing ore is exposed to air and water. The resulting acidic water then leaches toxic heavy metals such as copper, zinc, cadmium and other minerals from the ore. If not captured and treated, such discharges can be extremely toxic to fish and other aquatic life.¹⁴

For instance, an increase in copper of as little as two to eight parts per billion above natural stream levels impairs a salmon's ability to smell, which makes it harder to avoid predators, find mates and return to spawning grounds.¹⁵

The Tsoolum River on Vancouver Island historically provided abundant runs of coho, pink and chum salmon, as well as cutthroat trout and steelhead. Eventually, decades of logging and gravel mining began to take their toll.

The river was already suffering by 1964, when the Mt. Washington Copper Company set up in the upper Tsoolum watershed.



Photo left: Wild sockeye salmon in Adams River, BC (Isabelle Groc), right: Devastation after the Samarco mine disaster in Brazil (Ricardo Moraes/REUTERS).

The company began a small open-pit copper mine near the Tsoolum River, which it ran for just three years. Mining ended completely in 1966.

Copper began to leach but wasn't discovered until 1985, and by 2000 the Tsoolum River was declared dead. The fisheries had declined by up to 90 per cent.

The cause? Acid mine drainage from the long-gone company's abandoned mine. BC taxpayers pumped \$4.5 million into the desperate fight to bring the Tsoolum back to life. The fish are finally returning again, but hundreds of years from now citizens will still be wrestling with the mine's toxic legacy.¹⁶



TAILINGS DAMS WORLDWIDE: TOXIC TIMEBOMBS

Unfortunately, there are many examples of mine disasters and tailings dam breaches that have had devastating effects on communities and watersheds around the world. Here are just a handful of the major mine dam failures that have occurred in recent years:

November 5, 2015 – Samarco Iron Mine, Brazil 🇧🇷

When two dams holding mine waste collapsed, over 60 million cubic metres of water, tailings, iron and other waste materials poured into the Rio Doce River and down to the Atlantic Ocean, more than 500 km away. The disaster buried the small historic town of Bento Rodrigues under mud. At least 11 people died and more than 600 were displaced. The water supply of more than 250,000 people along the river was interrupted due to contamination.¹⁷

August 5, 2015 – Gold King Mine, USA 🇺🇸

Over 11,350 cubic metres of acid mine water began spilling from this abandoned mine in Colorado, after a cleanup crew supervised by the US Environmental Protection Agency accidentally caused a breach in a mine portal. The resulting spill turned water a shocking yellow-orange colour in the Animas River and it even reached the San Juan River, over 100 miles from the spill.¹⁸

August 6, 2014 – Buenavista del Cobre Copper Mine, Mexico 🇲🇽

When the mine tailings dam failed, 40,000 cubic metres of copper sulphate acid spilled in what has been called the "worst ecological disaster in Mexican history."

The effluent poured into the Bacanuchi River then into the Sonora River, directly affecting the water supply of 24,000 people.¹⁹

August 4, 2014 – Mount Polley Copper-Gold Mine, BC, Canada 🇨🇦

A breach in the mine tailings dam spilled over 25 million cubic metres of solid and liquid mine waste into Polley Lake, Hazeltine Creek and into Quesnel Lake – a major salmon rearing area. It was the biggest mine spill in Canadian history.²⁰

September 8, 2008 – Tashan Iron Mine, China 🇨🇳

A dam holding back sludge at this illegal iron mining operation burst after torrential rain, causing an industrial landslide that engulfed a small community in central China. Over 250 people were killed.²¹

October 23, 1997 – Pinto Valley Copper Mine, USA 🇺🇸

When the tailings dam collapsed at this Arizona mine, over 380,000 cubic metres of tailings mixed with water poured out – covering 25 hectares.²²

March 24, 1996 – Marcopper Copper Mine, Philippines 🇵🇭

More than 1 million cubic metres of mine tailings escaped the tailings pit through an old drainage tunnel. Many residents were forced to evacuate, and the local river system was severely degraded.²³

TROUBLE ALONG THE BORDER

BC Hydro's recently-completed \$716 million Northwest Transmission Line has sparked a simmering controversy with BC's Alaskan neighbours.

The controversial powerline parallels the border, winding 344 kilometres northward up the Stewart-Cassiar Highway. It was built to power up a mining boom on the BC side of the Canada-US border using cheap, subsidized hydropower – a gift from BC taxpayers to the mining industry.²⁴

So far, the only mine to get started is the Red Chris Mine, but one mine is bad enough according to the Alaskans, who point out that tailings spills on the

BC side of the border would threaten prime Alaskan salmon rivers.

Alaskan fishers are already very upset that an old mine on the BC portion of the Taku River, the Tulsequah Chief mine, continues to bleed mine pollution, which drains into their salmon waters.²⁵

Another huge mine being proposed on the BC side – the Kerr-Sulphurets-Mitchell (KSM) mine – would also involve holding a huge amount of tailings mixed with water behind an earthen dam.

BC's Minister of Mines has recently signed an agreement with his Alaskan counterparts over mining concerns – but critics say the agreement is weak, non-binding and therefore meaningless.²⁶

POLLUTERS MUST PAY... OR WE'LL BE LEFT WITH THE BILL

In 2002, BC's Auditor General expressed concern about the level and quality of financial bonding for rehabilitation of existing mine sites. When mine owners do not pay the full cost of rehabilitation, the taxpayer is left on the hook.²⁷

For example, the BC government has signed a 20-year contract with a private company to treat acid mine drainage pouring out of the closed Britannia Copper Mine, located in Howe Sound near Squamish. The

cost of the contract is \$27.2 million.

So far, this cost is covered by funds collected from the mining companies that formerly operated the Britannia Mine. But when the contract is up, all future costs of treating the acid run-off will be borne by BC taxpayers.²⁸

One recent report by MiningWatch Canada suggests that taxpayers in British Columbia may already face a liability of \$2 billion for abandoned mine sites throughout the province.²⁹

NO RIGHT WAY

"THERE'S NO RIGHT WAY TO DO WHAT'S WRONG!"

- chant heard during a rally to stop the New Prosperity gold and copper mine

Some places in BC should never have a mine because their ecology is just too fragile, or because local communities and livelihoods would be irreversibly affected. These areas should be designated as "no-go zones" for mining.

Recent examples include:

The New Prosperity gold and copper mine west of Williams Lake

The proposed mine was turned down in early 2014 by the federal government, which cited the unacceptable risk to the environment and First Nations' rights. The proposed mine would have deeply affected the health of nearby Fish Lake, as well as grizzly bear habitat and local communities.³⁰

The Catface copper mine and Fandora gold mine in Clayoquot Sound

Imperial Metals, notorious for the Mount Polley disaster, is exploring the potential of opening two mines in Clayoquot Sound. At risk are tourism and fisheries values, as well as areas important to First Nations.³¹

The Ajax copper-gold mine near Kamloops

The proposed Ajax mine is opposed by many residents because it is considered to be too close to where people live, work and go to school. Concerns over dust, toxic materials, water use, tailings spills and daily blasting make mining a non-starter so close to one of BC's major cities.³²



Photo left: Fishing for salmon near Fish Lake, BC (Gary Fiegehen), right: Protest against mining in Clayoquot Sound (Joe Foy).

TAILINGS DAM ALTERNATIVES: GET OUT OF THE WATER

The cheapest way for BC mines to manage tailings waste and the water needed for mine operations is to combine it all in a huge tailings storage facility, held back by one or more earthen dams.

As we have seen, this approach courts disaster. Problems occur if dams leak or collapse, or if the water held behind them is pumped into a nearby river, stream or lake. These occurrences are all bad news – particularly for BC's renowned wild salmon, and for those who rely on them for food or livelihood.

There are better ways.

One of them is 'dry stacking.' Rather than storing tailings under water, dry stacking involves removing much of the water from the mine waste for storage (though it may not be

completely dry). There are several types of dry stacking, including "wet cake" and "dry cake" tailings, which have different levels of saturation.

This method of tailings storage is much safer than mixing them with large volumes of water behind a big dam, and is best applied in combination with ongoing site reclamation. But dry stacking is often seen as more expensive by the mine owners – who do not take into account long-term costs savings or the potential costs of a massive spill.³³

The Hecla Greens Creek Mining Company's polymetallic mine (silver, gold, zinc and lead) is located on northern Admiralty Island in Alaska. This mine has successfully used a dry stacking system for tailings

management, even though it would have been cheaper in the short term to build a dam and "tailings lake." The mine is located not far from the BC border, in an area that gets a lot of rain and snow – just like BC.³⁴

Currently, BC mines are not obliged to implement the safest options for storing tailings. Huge conventional tailings dams holding large volumes of mine waste and water are still permitted, and are still the norm. That has got to change. Old-fashioned, dangerous mine tailings dams must be banned in BC, and existing ones cleaned up. The provincial government must hold mining companies accountable, and require the safest storage plans for toxic tailings.

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Photo left: Copper Mountain Mine tailings pond (Jeremy Sean Williams), right: Fraser River, BC (Stephen Rees, CC).

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TAKE ACTION

Contact BC's Premier now to help clean up the province's mining industry and protect our communities, watersheds and salmon.

Let the provincial government know how strongly you want:

- 1 A ban on dangerous mine waste tailings storage facilities filled with water, and requirements for safer storage methods
- 2 Legislated 'no-go zones' for mining in some areas to protect critical ecosystems, waters and livelihoods
- 3 A stop to industry self-regulation in favour of mandatory independent oversight and monitoring
- 4 A levy on all operating mines to ensure zero public liability and a multi-billion dollar mine clean-up fund
- 5 Required consent from local communities and First Nations before mine projects can proceed



Photo: Wolf (John E. Marriott).

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Photos: Fishers in Clayoquot Sound (Carla Moss).



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YES! LET'S CLEAN UP BC'S DIRTY MINING INDUSTRY

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