

TROUBLED WATERS

HOW MINE WASTE DUMPING IS POISONING
OUR OCEANS, RIVERS, AND LAKES

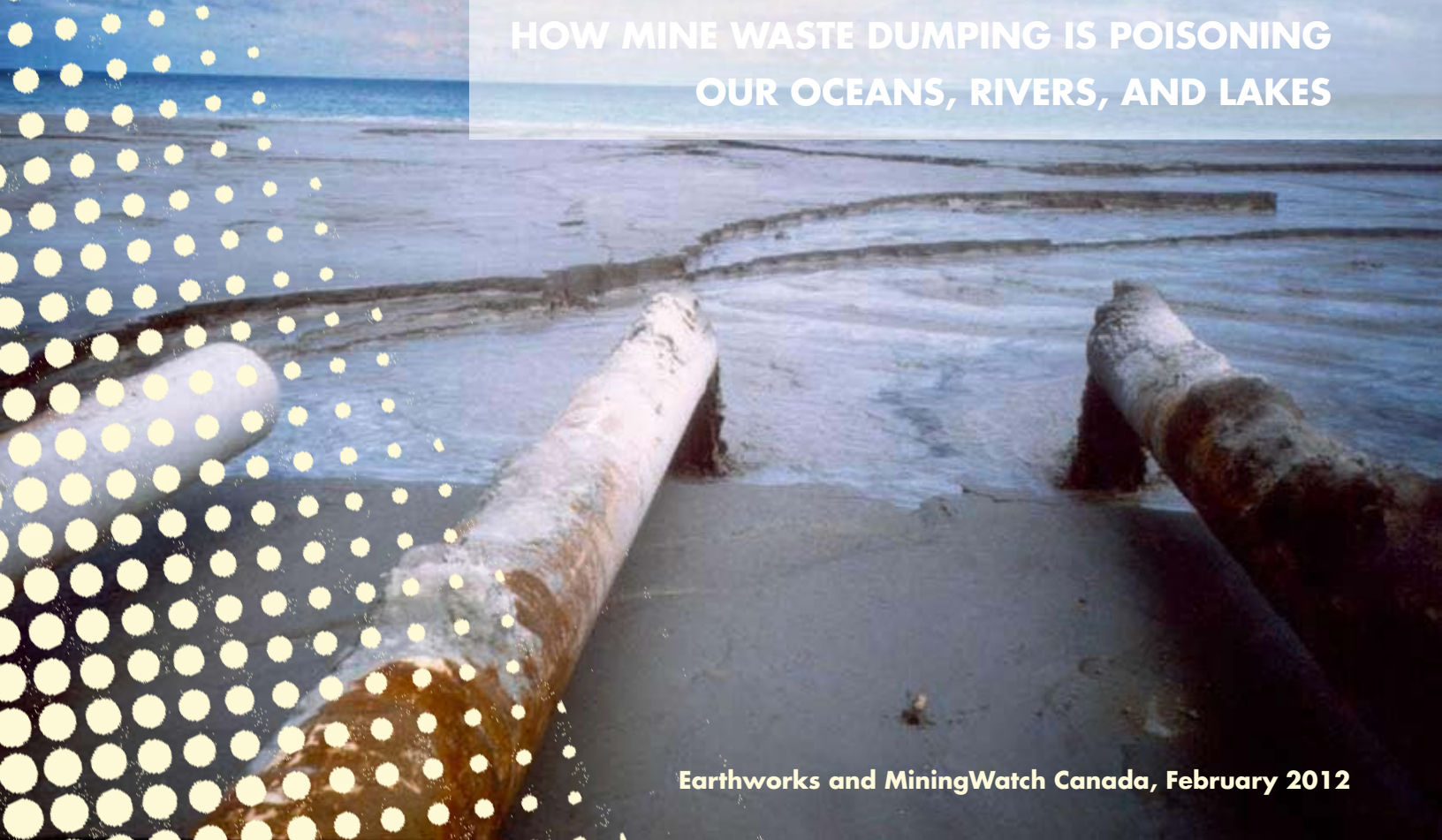


TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
TABLE 1. WATER BODIES IMPERILED BY CURRENT OR PROPOSED TAILINGS DUMPING.....	2
TABLE 2. MINING CORPORATIONS THAT DUMP TAILINGS INTO NATURAL WATER BODIES	4
TAILINGS DUMPING 101.....	5
OCEAN DUMPING.....	7
RIVER DUMPING.....	8
TABLE 3. TAILINGS AND WASTE ROCK DUMPED BY EXISTING MINES EVERY YEAR.....	8
LAKE DUMPING	10
CAN WASTES DUMPED IN BODIES OF WATER BE CLEANED UP?	10
CASE STUDIES: BODIES OF WATER MOST THREATENED BY DUMPING	11
LOWER SLATE LAKE, FRYING PAN LAKE ALASKA, USA.....	12
NORWEGIAN FJORDS.....	12
SENUNU BAY, INDONESIA.....	13
LUISE HARBOR, PAPUA NEW GUINEA.....	14
PIGIPUT BAY, PAPUA NEW GUINEA	15
BLACK SEA, TURKEY	15
OTOMINA AND AJKWA RIVERS, WEST PAPUA, INDONESIA.....	16
FLY RIVER, PAPUA NEW GUINEA.....	17
AUGA RIVER, PAPUA NEW GUINEA.....	18
CANADIAN LAKES	19
BASAMUK BAY, PAPUA NEW GUINEA	20
WHO'S DUMPING?.....	21
BARRICK GOLD (ABX)	22
BHP BILLITON (BHP).....	22
FREEPORT MCMORAN (FCX)	23
GOLDCORP INC. (GG)	23
NEWCREST MINING (NCM).....	24
NEWMONT MINING (NEM).....	24
RIO TINTO (NYSE: RTP; LONDON: RIO)	25
TECK (NYSE: TCK; TORONTO: TCK.A).....	25
VALE (VALE).....	26
XSTRATA (LONDON: XTA).....	26
CONCLUSION AND RECOMMENDATIONS	27
ENDNOTES	29

COVER PHOTOS

Bottom: Tailings from Marcopper mine entering Calancan Bay, Marinduque, Philippines. Credit: Catherine Coumans, MiningWatch Canada.
Top: Tailings from the Panguna copper mine in Bougainville have polluted the Kawerong-Jaba river system. Credit: Jessie Boylan.



PHOTO: EARTHWORKS

EXECUTIVE SUMMARY

ABOVE: Mine tailings at Barrick Gold's Porgera mine in Papua New Guinea.

MINING COMPANIES are dumping more than 180 million tonnes of hazardous mine waste each year into rivers, lakes, and oceans worldwide, threatening vital bodies of water with toxic heavy metals and other chemicals poisonous to humans and wildlife. The amount of mine waste dumped annually is 1.5 times as much as all the municipal waste dumped in U.S. landfills in 2009.¹

TROUBLED WATERS

Mine processing wastes, also known as tailings, can contain as many as three dozen dangerous chemicals including arsenic, lead, mercury and processing chemicals such as petroleum byproducts, acids and cyanide.² Waste rock, the extra rock that does not contain significant amounts of ore, can also generate acid and toxic contamination. The dumping of mine

tailings and waste rock pollutes waters around the world, threatening the drinking water, food supply and health of communities as well as aquatic life and ecosystems.

An investigation by Earthworks and MiningWatch Canada has identified the world's waters that are suffering the greatest harm or

TABLE 1. WATER BODIES IMPERILED BY CURRENT OR PROPOSED TAILINGS DUMPING, SELECTED EXAMPLES

BODY OF WATER	MINES AND LOCATION	TYPE OF ORE	TYPE OF DUMPING	COMPANY OR COMPANIES RESPONSIBLE
Basamuk (Astrolabe) Bay, Bismarck Sea	Ramu Nickel and Yandera mines, Papua New Guinea	nickel-cobalt; copper-gold	Marine (proposed)	Metallurgical Construction Corp., Highlands Pacific (Ramu); Marengo Mining (Yandera)
Norwegian Fjords	Kirkenes, Kvannevan, Stjernøya, Hustadmarmor, Skaland, Engebøfjellet, & Repparfjorden	iron, industrial minerals, titanium, copper	Marine (proposed & actual)	Northern Iron Ltd., LNS AS, Sibelco Nordic, Omya Group, Nordic Mining, Nussir
Canadian lakes	Across Canada	gold, nickel, copper, copper-gold, copper-zinc, iron, diamonds	Lakes (proposed & actual)	Agnico-Eagle, BHP Billiton, Cleveland Cliffs, Crowflight Minerals, De Beers, Goldcorp, Taseko Mines, Imperial Metals, Jolu Central Gold, Marathon PGM, Mitsubishi Metals, Newmont, Rio Tinto, Teck, Tyhee NWT, Vale, Xstrata
Senunu Bay	Batu Hijau mine, Indonesia	copper-gold	Marine	Newmont Mining, Sumitomo Mining
Luise Harbor	Lihir mine, Papua New Guinea	gold	Marine	Newcrest Mining
Pigiput Bay	Simberi mine, Papua New Guinea	gold	Marine	Allied Gold
Black Sea	Cayeli Bakir, Turkey	copper-zinc	Marine	Inmet Mining
Otomina and Ajkwa Rivers, Arafura Sea	Grasberg mine, West Papua	copper-gold	River	Freeport McMorRan, Rio Tinto
Porgera River, Fly River system	Porgera mine, Papua New Guinea	gold	River	Barrick Gold
Ok Tedi River, Fly River system	Ok Tedi mine, Papua New Guinea	copper-gold	River	Ok Tedi Mining Ltd.
Auga River	Tolukuma mine, Papua New Guinea	copper-gold	River	Petromin Holdings
Lower Slate Lake	Kensington mine, USA	gold	Lake	Coeur D'Alene Mines Corp.



PHOTO: DAMIAN BAKER

are at greatest risk from dumping of mine waste. **(See Table 1.)** Based on a review of government reports, news media accounts and more than 100 peer-reviewed scientific articles, we have catalogued the wide range of damage and hazards to ecosystems, wildlife and human health caused by tailings dumping into natural water bodies. We have also identified the leading multinational companies that continue to use this irresponsible practice. **(See Table 2.)**

Our investigation found that of the world's largest mining companies, only one – BHP Billiton of Melbourne, Australia, and London, UK – has adopted policies against dumping in rivers and oceans, and none have policies against dumping in lakes.³ (Previously, two other companies - Falconbridge, now part of

Xstrata, and WMC, now part of BHP Billiton - had adopted similar policies.) Many of these companies are also guilty of an unjust double standard: they dump toxic mine tailings in waters around the world even though the nations where many are chartered have prohibited or restricted the practice. At least half of the members of the International Council on Mining and Metals – a network of 20 mining and metals companies formed in 2001 “to address the core sustainable development challenges faced by the industry” – currently dump tailings into bodies of water or have plans to do so.⁴

In a world where climate change, ocean acidification, overfishing and recurring

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ABOVE: Panguna mine, Bougainville, Papua New Guinea.

TROUBLED WATERS

tragedies like the Gulf of Mexico oil spill are already disrupting water and food supplies, polluting the world's waters with mine tailings is unconscionable – and the damage it causes is largely irreversible. No feasible technology exists to remove and treat mine tailings from oceans; even partial cleanup of tailings dumped into rivers or lakes is prohibitively expensive. There is but one workable solution: *Mining companies must stop dumping into natural bodies of water.*

In some cases, safer waste management options exist: putting dry waste in lined and covered landfills (a process called dry stacking) and putting tailings back into the pits and tunnels the ore came from (called backfilling). In other cases, even land-based tailings disposal is too risky. Some places where companies want to dump tailings are simply inappropriate for mining and should be *no-go zones*. The protection of such areas must be coupled with more efficient use of metals and support for sustainable development and livelihoods that do not endanger communities' health and safety.

A number of nations have adopted prohibitions or restrictions on dumping mine tailings in natural bodies of water. Nations with some restrictions on dumping – including the United States, Canada and Australia – are home to major mining companies that use practices internationally that they wouldn't be allowed to use at home. Even these national regulations, however, are being eroded by amendments, exemptions, and loopholes that have allowed destructive dumping in lakes and streams.

Non-governmental initiatives to promote responsible mining by corporations can play an important role in helping close regulatory loopholes. Civil society organizations working to encourage more responsible mining are calling on mining companies to end water-based tailings dumping, as are consumers and retailers of mined products such as jewelry and electronics. In turn, the mining industry as a whole must share our collective responsibility to protect water and aquatic ecosystems by pledging not to dump mine wastes in Earth's most precious resource: water.

TABLE 2. MINING CORPORATIONS THAT DUMP TAILINGS INTO NATURAL WATER BODIES

COMPANY	HEADQUARTERS	MAJOR LOCATION(S) OF DUMPING
Barrick Gold	Toronto, Canada	Fly River, Papua New Guinea
BHP Billiton	Melbourne, Australia / London, UK	Long Lake, Northwest Territories, Canada
Freeport McMoRan	Phoenix, USA	Ajka River, West Papua
Goldcorp Inc.	Vancouver, Canada	Crazy Wind Pond, Ontario, Canada; King Richard Creek, British Columbia, Canada (proposed).
Newcrest Mining	Melbourne, Australia	Luise Harbor, Papua New Guinea; Koro Sea, Fiji (proposed)
Newmont Mining	Denver, USA	Senunu Bay, Indonesia; Tail Lake, Nunavut, Canada (proposed), Cerro Minas Conga lakes, Peru (waste rock, proposed)
Rio Tinto	London, UK / Melbourne, Australia	Ajka River, West Papua; Wabush Lake, Labrador, Canada; Cassidaigne Canyon, Mediterranean Sea
Teck	Vancouver, Canada	Trout Pond, Newfoundland and Labrador, Canada; Garrow Lake (closed), Northwest Territories, Canada
Xstrata	Zug, Switzerland	Moose Lake, Ontario, Canada; Lake Watson, Quebec, Canada
Vale	Rio de Janeiro, Brazil	Sandy Pond, Newfoundland and Labrador, Canada, Meatbird Lake, Ontario; Thompson Lakes, Manitoba, Canada

Note: This is not a comprehensive list of companies or sites.



TAILINGS DUMPING 101

PHOTO: PORGERA ALLIANCE, [HTTP://PORGERAALLIANCE.NET](http://PORGERAALLIANCE.NET)

ABOVE: Local community members standing on a mine waste pile at the Porgera mine in Papua New Guinea, where waste is directly discharged into waterways.

LOWER SLATE LAKE sits at an elevation of 200 meters in a remote and roadless region of the Tongass National Forest, about 80 kilometers north of Juneau, Alaska. Slate Creek flows from the lake five kilometers downstream into Berners Bay. The lake and the bay have historically supported an abundance of life – salmon, trout and other commercial and sport fish, eagles, bears, mountain goats, sea lions, humpback whales and many other important species. The Berners Bay area is also culturally significant to the Auk Kwaan Tlingit people and encompasses several ancient village sites in the shadow of the sacred Lions Head Mountain.



MINING

There are two basic kinds of mining: open-pit mines that can be many kilometers wide and underground mines that can extend kilometers below the surface of the earth.



TRANSPORTATION

waste rock is trucked or sent on conveyor systems while tailings are sent in pipelines for disposal.



PROCESSING

Toxic chemicals such as cyanide, are applied to the rock to extract the precious metals within.



DUMPING

A cheap, but ecologically destructive path taken by some companies, is to dump their waste in oceans, rivers and lakes. The wastes smother and contaminate much of the life in these valuable ecosystems.

FOR TOXIC MINE WASTE, THE PATH TO RIVERS, LAKES AND OCEANS IS FAR TOO EASY

In June 2010, after 20 years of legal and administrative battles that ended at the U.S. Supreme Court, Coeur d'Alene Mines Corp. of Idaho began extracting ore from the Kensington Gold Mine, which is expected to generate an estimated 7 million tonnes of process waste, or tailings. To hold most of that waste, the company has drained Lower Slate Lake and is dumping the tailings into the lake basin, killing all aquatic life.

This scenario is being repeated around the world. Every day, mining operations dump thousands of tonnes of waste into streams, rivers, lakes and oceans. The practice is euphemistically called sub-aqueous tailings disposal. But in plain language it means that mining companies are dumping their trash – mammoth quantities of waste from gold, copper, nickel, zinc, iron, and other mines – directly into natural bodies of water. These finely-ground tailings contain arsenic, lead, mercury and other toxic chemicals. They have poisoned aquatic life, polluted fisheries, and harmed the livelihoods and food supply of thousands of people.

Mining companies have pushed to mine in places that are inappropriate and risky for the storage of mountains of toxic waste – sites with steep topography, heavy rainfall, earthquakes or small landmass such as islands. Once a company makes the decision to mine in such sites, the waste has to go somewhere. In many cases, companies do not want to take on the expense required for safer methods of tailings disposal.⁵ Alternative disposal methods such as backfilling (returning the waste to the pits from which the ore was extracted) or dry stacking (dumping dried tailings in lined and covered landfills) are safer but would generally cost the company more than uncontained dumping. In reality, the uncontained dumping of tailings into natural water bodies is more costly, but the true cost of such dumping is externalized and borne by local communities and damaged ecosystems.

Exactly how much mine waste is being dumped into bodies of water each year is challenging to estimate. In most cases, mining

companies do not make data on dumping public, and in many places, there is only minimal legal oversight of the practice. The amount of tailings dumped just from the mines identified in this report exceeds 180 million tonnes a year. **(See Table 3.)** Most of that comes from three huge open-pit mines: the Grasberg mine in West Papua, owned by Freeport McMoran and Rio Tinto; the Batu Hijau mine in Indonesia, owned by Newmont Mining and Sumitomo Mining; and the Ok Tedi mine in Papua New Guinea, owned by Ok Tedi Mines Ltd.

Each category of water dumping – into the ocean, in lakes, in rivers and streams – brings with it a different set of problems and destructive impacts.

OCEAN DUMPING

Ocean dumping – in industry terms, *submarine tailings disposal (STD)* – is the dumping of waste below the ocean's surface using pipes that carry tailings from a mine into the sea. Historically this has included dumping just offshore (*shallow STD*), but most dumping of tailings into the ocean is now farther out and into deeper water (*deep STD*, sometimes called *deep sea tailings placement*).⁶

Ocean tailings dumping can contaminate marine life with toxic heavy metals and milling chemicals. These metals and chemicals may build up in high concentrations in the marine food chain and thus cause human health effects as well. Those contaminants, as well as the turbidity (murkiness from suspended particles) and smothering effect (cutting off the supply of water and oxygen) from the tailings cause harm to marine life.

Mining companies characteristically predict that contamination from tailings dumped into the ocean will not spread far beyond where they are initially placed or intended to settle. These predictions have been wrong in the majority of cases and impacts on marine life have been extensive. At the Island Copper and Kitsault

TROUBLED WATERS

mines in Canada , tailings from relatively shallow marine dumping have traveled distances of 5 to 35 kilometers.⁷ Tailings from deep sea dumping at the Lihir and Misima mines in Papua New Guinea have also been found to travel beyond the predicted deposition area.⁸

The integrity of the pipelines that carry the tailings to the deeper water is also a serious concern. At least half of the 12 principal ocean dumping operations currently or recently operating have had pipe accidents. For example, in 2000, Newmont Mining's Batu Hijau copper-

gold mine in Indonesia spilled around 5,000 cubic meters of tailings after only 13 months of operation.⁹

RIVER DUMPING

River dumping – in industry terms, *riverine tailings disposal* or *RTD* – is the practice of disposing of mine tailings into river valleys. Mining operations dump tailings in rivers either with or without dams to contain the wastes. Both methods are harmful, but uncontained dumping is of greater concern because it is

TABLE 3. TAILINGS AND WASTE ROCK DUMPED BY EXISTING MINES EVERY YEAR*

MINES, LOCATION	TYPE OF DUMPING	TAILINGS DUMPED EACH YEAR (TONNES)
Grasberg, West Papua	River	> 80 million ¹
Batu Hijau, Indonesia	Marine	> 40 million ²
Ok Tedi, Papua New Guinea	River	> 22 million ³
WabushScully, Labrador, Canada	Lake	13 million ⁴
Lihir, Papua New Guinea	Marine	> 5 million ⁵
Porgera, Papua New Guinea	River	> 5 million ⁶
Ekati, NWT, Canada	Lake	> 4 million ⁷
Bøkfjord, Norway	Marine	4 million ⁸
Meadowbank, Nunavut, Canada	Lake	> 2 million ⁹
Cayeli Bakir, Turkey	Marine	> 1 million ¹⁰
Musselwhite, Ontario, Canada	Lake	> 1 million ¹¹
Simberi, Papua New Guinea	Marine	> 1 million ¹²
Sudbury-Strathcona, Ontario, Canada	Lake	> 1 million ¹³
Duck Pond, Newfoundland, Canada	Lake	> 600,000 ¹⁴
Carol, Labrador, Canada	Lake	> 500,000 ¹⁵
Rana Gruber, Norway	Marine	> 500,000 ¹⁶
Kensington, USA	Lake	> 300,000 ¹⁷
Tolukuma, Papua New Guinea	River	> 160,000 ¹⁸
TOTAL		>180 million

* Table 3 sources: see pages 41-42



PHOTO: SARAH KNUCKLEY

nearly impossible to control or monitor the movement and chemical transformation of the tailings.

River dumping has a long and notorious history around the world:

- ▶ In the United States, companies mining for gold, silver and copper dumped tailings in streams and rivers in states such as Montana, Louisiana, and Nevada into the 1970s.¹⁰ Some of those watersheds now are among the most polluted Superfund sites in the country, and the practice of using streams as waste dumps continues in the United States today.
- ▶ In Papua New Guinea, the Bougainville copper mine of Rio Tinto dumped eroding waste rock and more than 500 million tonnes of tailings into the Kawerong and Jaba Rivers, before protests and civil war forced the company to abandon the mine in 1989.¹¹
- ▶ In Peru, Southern Peru Ltd. (now Southern Copper/Grupo Mexico) dumped more than 100,000 tonnes of tailings daily from the Toquepala and Cuajone mines into the Locumba River between 1960 and 1996.¹²
- ▶ In Japan, the lead-zinc Kamioka Mines (Mitsui Mining and Smelting Co.) dumped cadmium-laden tailings without containment near and into the Takahara and Jinzu Rivers until the 1950's, causing painful bone and kidney diseases for people downstream.¹³

River dumping has caused extensive damage to rivers and associated ecosystems and resources. Tailings clog river channels and change their courses, cause floods, destroy vegetation

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ABOVE: Local community members are forced to risk their lives crossing makeshift bridges across a river of tailings waste that is dumped by Barrick Gold's mine in Porgera, Enga Province, Papua New Guinea.

and create obstacles to navigation.¹⁴ Tailings have smothered and flooded vast areas of wetlands and forests.¹⁵ Tailings contaminate the water and the river bed downstream with sediment, toxins and acid drainage that can persist for many decades after dumping ends.¹⁶ They destroy aquatic habitat, poison fish with toxins such as cadmium, lead, and copper, and have killed fish and other wildlife, including waterfowl.¹⁷ Contamination can also spread from rivers to floodplains: in the Coeur d’Alene basin of Idaho, over 3,800 square kilometers of floodplain were contaminated and tailings toxins killed grazing livestock.¹⁸ Mine wastes originally dumped into rivers have contaminated private drinking water wells and forced people to relocate their homes.¹⁹

LAKE DUMPING

Lake dumping – *lacustrine tailings disposal* or *LTD* – is the dumping of mine tailings into natural lakes. This dumping may be uncontained or contained by dams. Just as with fully constructed tailings impoundments, dams built for containing tailings dumped into natural lakes come with risks of pollution and failures. Although previously halted in the U.S. and declining in practice in Canada, recent legal loopholes and regulatory amendments, as seen in the Kensington mine case in Alaska, are encouraging companies to plan and implement lake dumping at several sites in North America. Companies are currently dumping more than 20 million tonnes of tailings per year into lakes in Canada and the United States.

Dumping of tailings into natural lakes has destroyed sensitive habitat and decimated aquatic life. The tailings have filled entire lakes and spread over and smothered bottom life over vast stretches of large lakes such as Lake Superior.²⁰ The concentrations of contaminants in lake water and bottom sediments can be extremely high; for example, water in Balmer Lake, Ontario had arsenic over 500 times the U.S. Environmental Protection Agency limit of safety for aquatic life.²¹

CAN WASTES DUMPED IN BODIES OF WATER BE CLEANED UP?

In most cases, natural water bodies cannot be completely “cleaned up” after years of mine waste dumping. Particularly in unconfined and deep water settings such as the ocean, such cleanup is at best extremely difficult and in most cases impossible.²² Attempts to limit contamination and clean up rivers fouled by mine waste have proven extremely difficult and cost-prohibitive. For example:

- In Idaho, Coeur d’Alene Mines Corp. dumped 56 million tonnes of tailings in the Coeur d’Alene River and Lake Coeur d’Alene, which were also contaminated with acid mine drainage.²³ Partial cleanup costs awarded as part of the corporation’s bankruptcy settlement included a lump sum of over US\$79 million and an additional US\$28 million for a cleanup trust fund.²⁴ A broader cleanup plan proposed by the U.S. EPA would cost over US\$300 million, and a relatively thorough cleanup is estimated to require US\$1 billion and take 20 to 30 years.²⁵
- In Tasmania, the Mt. Lyell mine dumped 97 million tonnes of tailings into the Queen and King Rivers by 1994 but the rivers have yet to be properly cleaned up.²⁶ By 2002, the partial cleanup costs for acid drainage and tailings were estimated to be over US\$99,000,000 and the Tasmanian government has essentially given up on cleanup or even partial remediation.²⁷
- At the Grasberg mine in West Papua, Indonesia, Freeport McMoran and Rio Tinto have attempted to limit the spread of tailings to the sides of the Ajkwa River using levees. These cost US\$25 million to build and US\$12 million per year to operate.²⁸



CASE STUDIES

BODIES OF WATER MOST THREATENED BY DUMPING

PHOTO: MINERAL POLICY INSTITUTE

ABOVE: Freeport McMoRan's Grasberg mine in West Papua dumps its tailings into the Otomin and Ajkwa rivers.

TAILINGS DUMPING practices are directly polluting bays, fjords, rivers and lakes around the world. This section documents examples of nine bays and fjords, three river systems and nine lakes where mine wastes are currently being dumped, and several others that are threatened by such dumping. In total, companies are dumping more than 180 million tonnes of tailings per year into these oceans, rivers, and lakes. That is the equivalent of 1.5 times the amount of municipal solid waste that the United States sent to landfills in 2009.²⁹

LOWER SLATE LAKE, FRYING PAN LAKE ALASKA, USA



COEUR D'ALENE Mine Corporation's Kensington gold mine has destroyed Lower Slate Lake in southeast Alaska. This operation has drained most of the 9-hectare lake and is discharging tailings into the basin, killing

all fish and destroying the aquatic habitat.³⁰ After a number of administrative and legal challenges to permits and U.S. Army Corps of Engineers jurisdiction, and requests by the U.S. Environmental Protection Agency to the Army Corps to prevent lake destruction, the issue came before the U.S. Supreme Court in 2008.³¹ The Supreme Court decided in 2009 in favor of the mining company. In spite of the EPA's entreaties to the Army Corps to reconsider and in spite of evidence of acid rock drainage, Coeur retained its Corps-issued permits to dump tailings in Lower Slate Lake.³² By permitting the destruction of Lower Slate Lake for Kensington Mine's tailings disposal facility, the Supreme Court has set a precedent by which other companies and industries may try to dump their waste into lakes.³³ As a result, proposed projects such as the Pebble mine near Bristol Bay, Alaska, may seek to be allowed to pollute waterways in a similar fashion. The Pebble project of Anglo American and Northern Dynasty previously considered dumping uncontained tailings into Iliamna Lake, and is still considering incorporating Frying Pan Lake into a massive tailings pond.³⁴

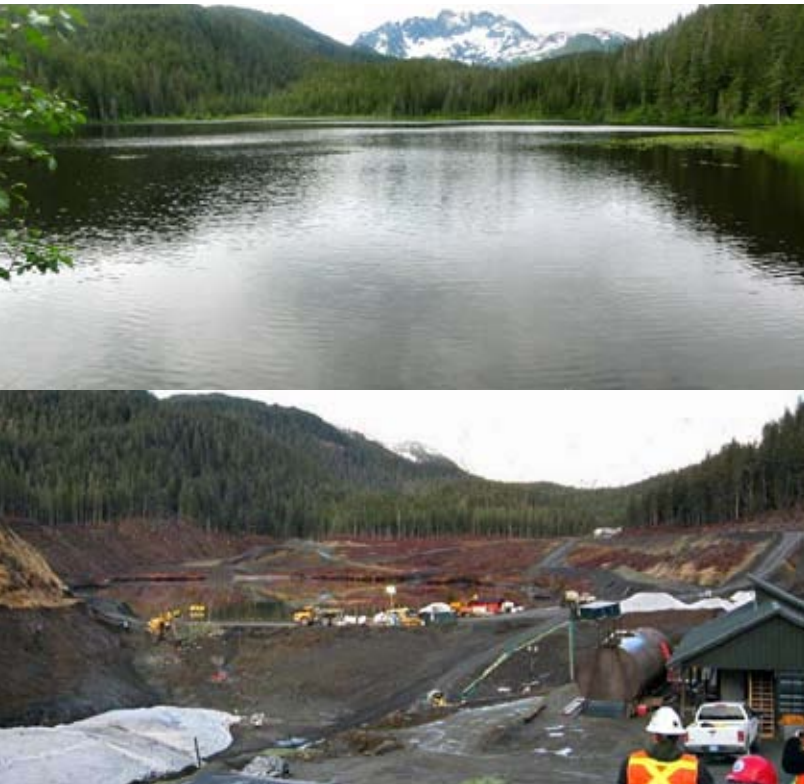


PHOTO: IRENE ALEXAKOS; ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION



NORWEGIAN FJORDS



SEVERAL COMPANIES are dumping or proposing to dump tailings into ocean fjords on the coast of Norway. Most of these projects are iron ore and industrial mineral mines.

➤ The Northern Iron Ltd. (Sydvaranger Gruve SA) iron mine at Bøkfjord dumps approximately 4 million tonnes of tailings per year at a depth of approximately 28 m into a designated national salmon fjord. The tailings include tonnes of

processing chemicals that have caused concern for aquatic life and persist in the environment for many years.³⁵ Since recent dumping started in 2009, tailings have spread in the fjord several kilometers from the dumping site, and the dumping has destroyed habitat and apparently reduced numbers of bottom-dwelling organisms.³⁶

➤ Rana Gruber SA, a subsidiary of Leonhard Nilsen & Sønner Eiendom AS, dumps iron mine tailings from the Kvanneveann underground mine

in the Rana Fjord north of Mo I Rana. The mine has dumped more than 500,000 tonnes per year into the fjord.³⁷

- ▶ Sibelco Nordic dumps hundreds of thousands of tonnes of tailings per year from mining of nepheline syenite on the island of Stjernøya into a fjord in Finnmark.³⁸ At Elnesvågen in Møre og Romsdal, the Hustadmarmor processed limestone mine owned by the Omya Group dumps hundreds of thousands of tonnes per year into Frænfjorden. The Skaland Graphite mine of Leonhard Nilsen & Sønner Eiendom AS on the island of Senja in Troms also dumps tailings into a fjord.³⁹
- ▶ At Førdefjord in western Norway, Nordic Mining is planning to dump 3 million tonnes per year of tailings from its Engebøfjellet titanium mine into another salmon-bearing fjord.
- ▶ The Nussir ASA company is planning to dump tailings from its underground copper mine into

PHOTO: GWIKI COMMONS



the Repparfjorden, another

.....
ABOVE: Kirkenes Harbor,
 Finnmark, Norway.

national salmon area.

The tailings would affect important habitat for salmon and other fish.⁴⁰

SENUNU BAY, INDONESIA



SINCE 2000, the Batu Hijau copper-gold mine on Sumbawa Island has dumped tailings into Senunu Bay (Indian Ocean) via a pipeline that extends 3.4 km offshore to a depth of 120 meters.⁴¹ The mine is owned and operated by the US Newmont Mining Corp., with minority stakes held by Indonesian and Japanese shareholders. The ocean pipeline broke at least once after only 13 months of operation, dumping tailings into an area with coral reefs.⁴² The Indonesian environmental group, WALHI, has conducted tests that show reduced fish populations and water pollution between 2006 and 2010; the mine dumps over 40 million tonnes of tailings into the ocean every year.⁴³ Because of such contamination concerns, many people have protested the mine and asked for compensation for the pollution, and local governments have sought to put stricter limits on dumping.⁴⁴ In May 2011, the local West Sumbawa government

appealed to the Indonesian government to not renew the mine's permit to dump tailings into the ocean.⁴⁵ The national government, after approving a new permit with a few additional conditions, now faces a lawsuit from civil society organizations that are concerned about the dumping.⁴⁶

The mine has also come under criticism for a tailings spill from a pipe on land, for destroying rainforest in an Important Bird Area, for seeking permission to expand the mine and waste rock piles by over 70 acres into a protected forest and Key Biodiversity Area, for failing to report a major pit failure and cleanup costs to shareholders, for overtime rate disputes that led to strikes, and for its exploration and expansion plans at Elang/Dodo Rinti.⁴⁷ In spite of these controversies and the impacts of the mine, Newmont is proceeding with its expansion plans and in June 2011 signed a loan agreement with a consortium of banks including Goldman Sachs Lending Partners LLC and BNP Paribas SA.⁴⁸

LUISE HARBOR, PAPUA NEW GUINEA



THE LIHIR GOLD MINE on the island of Anioloam has operated since 1997 and dumps over 5 million tonnes of tailings per year 1.5 kilometers offshore into the Luise Harbor and the South

Pacific Ocean at a depth of approximately 120 meters.⁴⁹ The acidic, warm tailings (pH 1-2.3) include zinc, copper, arsenic, cadmium, mercury, lead, and cyanide.⁵⁰ The dumping has caused high concentrations of lead, copper, vanadium, and arsenic in the bottom sediment, and toxic levels of arsenic occur in suspended matter in the water column.⁵¹

The tailings appear to have a serious negative impact on marine life. Corals and other bottom-dwelling ocean life are less common and less diverse in tailings dumping areas even at great depths, and bottom dwellers are more contaminated with mercury and arsenic.⁵² Corals in the dumping area died off in far greater numbers than in other areas after a coral bleaching event in 2006.⁵³ Fish diversity and abundance is also lower, apparently because of

the tailings dumping, and arsenic and mercury concentrations in several fish species are at higher concentrations closer to the mine.⁵⁴

In spite of the demonstrated contamination and provincial government calls for regulation of the dumping, the mine – which is owned by Australia’s Newcrest Mining Ltd. – is upgrading its processing plant to produce more gold and tailings in 2013.⁵⁵ The mine displaced a number of people in order to begin its operations; however, as of 2007, some Kapit people still resisted relocation. Furthermore, local communities have refused to allow mining of the Ailaya sacred site, jeopardized by the mine.⁵⁶

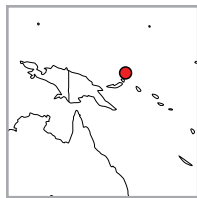
The mine project began with financing and risk guarantees from the Australian Export Finance and Insurance Corporation, Union Bank Switzerland and a political risk guarantee from the World Bank’s Multilateral Investment Guarantee Agency (MIGA).⁵⁷

BELOW: The Lihir mine site, with the sacred Ailaya site (center), dumps tailings into Luise harbor and the South Pacific (left).



PHOTO: GLENN BANKS

PIGIPUT BAY, PAPUA NEW GUINEA



THE SIMBERI GOLD MINE began operation in 2008 and dumps tailings into Pigiput Bay and the South Pacific Ocean from a pipeline extending to a depth of 115 m.⁵⁸ The Australian mining company, Allied Gold, has shared little information on the current and expected impacts of the project, but contamination incidents have already occurred.

In early 2010, landowners protested against environmental damages to creeks and coral reefs and dangerous conditions and imposed a government-supported cease work order.⁵⁹ The company caused a related uproar soon after the protests when it flew in a dozen Fijians without work permits to provide security for the mine.⁶⁰ The governor of New Ireland even told the company to “get out of Simberi and New Ireland if you are not willing to consult, listen and negotiate amicably with local landowners.”⁶¹

In March 2011, the mine leaked tailings waste from its tailings mixing tank. The leak apparently contained cyanide and may have contaminated ocean waters and

killed fish.⁶² The Department of Environmental Conservation ordered the mine to stop milling operations and make repairs, and initiated an independent investigation into the cause and impacts.⁶³ People on the island have condemned the company for the contamination and reported dead marine life.⁶⁴ The New Ireland Provincial Assembly has called on the PNG government to take legal action against Allied Gold.⁶⁵

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BELOW: Simberi gold mine, Papua New Guinea.

PHOTO: LENG LENG TAN



BLACK SEA, TURKEY



THE CAYELI BAKIR copper-zinc underground mine started in 1994 and dumps around 12,000 tonnes per day (at least 3 million tonnes per year) of tailings into the Black Sea.⁶⁶ Tailings include toxins such as arsenic, cadmium, chromium, lead, and mercury.⁶⁷ The mine uses about half of the tailings as backfill in the underground mine workings, but dumps the rest.⁶⁸

The pipeline outfall is 3 kilometers offshore and was 387 meters deep but was accidentally reduced to approximately 250 meters in depth when the pipe was deformed by negative pressure.⁶⁹ The pipeline also floated up because of algae clogging the seawater intake pipe, and a storm caused problems with the system's valves.⁷⁰ Buoyant plumes of tailings may rise nearly 100 meters above the outfall pipe rather than settling as predicted.⁷¹



PHOTO: JIM ELMSLIE

OTOMINA AND AJKWA RIVERS, WEST PAPUA, INDONESIA



ONE OF THE WORLD'S most egregious examples of tailings dumping is Freeport McMoRan's Grasberg copper-gold-silver mine in West Papua, Indonesia. The mine dumps

tailings that flow into the Otomina and Ajkwa rivers, to wetland estuaries, and out to the Arafura Sea. The mine produces and dumps over 200,000 tonnes of tailings per day (over 80 million tonnes per year).⁷² Estimates show the mine will have produced over three billion tonnes of tailings before it closes.⁷³ The tailings contain high concentrations of toxins such as copper, arsenic, cadmium, and selenium. Releasing these toxins into the environment is a violation of Indonesian law.⁷⁴ Company reports have revealed that the rivers and wetlands are unsuitable for aquatic life because of the tailings dumping. The tailings have buried over 166 square kilometers of formerly productive forest and wetlands, and fish have largely disappeared.⁷⁵ The tailings have also contaminated the coastal estuary and Arafura Sea and possibly the Lorentz National Park, a World Heritage site.⁷⁶

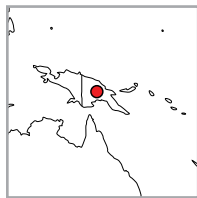
The U.S. Overseas Private Investment Corp. (OPIC), an export credit agency of the U.S. Government that helps finance and insure U.S. companies in other countries, suspended its

insurance for the project in 1995 in part because of its use of river dumping. The Norwegian Pension Fund has also excluded investment in Freeport or Rio Tinto (a partner in the project), because of the dumping at Grasberg.⁷⁷ The World Bank's Multilateral Investment Guarantee Agency (MIGA) also prepared to investigate concerns with its US\$50 million guarantee from the project, but the mine canceled that guarantee before the investigation began.⁷⁸ Freeport has continued to dump tailings into the Otomina River despite the lack of a waste-dumping permit from the national government and in spite of ongoing requests from the Ministry of Environment to find alternatives to the pollution.⁷⁹ The mine has also caused acid rock drainage from its waste rock dumps, destruction of lakes and forests, and destruction of livelihoods, food sources, and areas of spiritual significance for the Amungme and Kamoro Indigenous Peoples.⁸⁰

Militarization of the area has led to killings and other human rights violations.⁸¹ The company has continued to pay the Indonesian military and police for protection of the mine.⁸² The mine and company have received financing from a number of commercial banks, including JP Morgan Chase and Merrill Lynch.⁸³

ABOVE: Freeport McMoRan's Grasberg mine in West Papua.

FLY RIVER SYSTEM, PAPUA NEW GUINEA



WASTE ROCK from the Porgera gold mine erodes and drains into the local river system and tailings are dumped into the Porgera River, which joins the Ok Om, Strickland, and Fly

rivers flowing to the Gulf of Papua in the Coral Sea. The mine, owned by Canada's Barrick Gold, dumped more than 6 million tonnes of tailings and more than 12 million tonnes of sediment eroded from the waste rock dumps into the river in 2008.⁸⁴ The tailings contain high concentrations of toxins including cyanide and the waste rock has demonstrated acid rock drainage problems.⁸⁵

The dumping has contributed to increased sedimentation, changes in flow and depth in the rivers and contaminated them with large quantities of arsenic, lead, mercury, and other toxic chemicals.⁸⁶ Fish populations downstream of the mine are less plentiful than before and people in the area fear the mine is causing contamination of fish and livestock.⁸⁷ The tailings appear to be responsible for inputs of mercury into southern Lake Murray.⁸⁸ The Norwegian Pension Fund has excluded Barrick Gold from its investment portfolio because of the use of river dumping at Porgera.⁸⁹ The mine has also been implicated in severe human rights violations, including alleged assaults and rapes by mine security, forced evictions, and the burning of houses.⁹⁰

The Ok Tedi copper-gold mine started in 1984 and dumps tailings in the Ok Tedi River, a tributary of the Fly River. The mine has dumped on average more than 20 million tonnes of tailings per year.⁹¹ The mine also dumps approximately 30 million tonnes of waste rock down steep eroding slopes every year.⁹² The dumping, and the effect on the riverbed in particular, reduced fish populations by 60 to 80 percent along 300 kilometers of the Ok Tedi and the Fly Rivers. The fish remaining in the rivers, especially closer to the mine site, are

heavily contaminated with cadmium and lead.⁹³ The dumping has led to contamination of the Gulf of Guinea as well, with high concentrations of copper and cadmium occurring near the Fly River delta.⁹⁴ Tailings are producing acid rock drainage and even after mining stops, impacts on the rivers are expected to continue for several hundred years.⁹⁵ Dumping has destroyed over 1,600 square kilometers of forest and is expected to destroy a total of 3,000 to 4,200 square kilometers that will likely not recover as forest.⁹⁶

In 1994, opponents of the dumping at Ok Tedi filed a lawsuit against then-owner Broken Hill Proprietary (BHP) and settled out of court in 1996 for an estimated US\$ 500 million in compensation and commitments to contain the tailings.⁹⁷ BHP opted to dredge some of the tailings but did not contain them. In 2002, the company withdrew from the project to limit liability rather than altering the dumping scheme.⁹⁸

In May 2011, a pipeline on land broke in several areas and contaminated the environment with pyrite waste that spread to streams at least 2 km downstream.⁹⁹ The Western province governor called for strong fines against the mine for the spill and the mine operations were suspended for weeks.¹⁰⁰ Operations resumed after the company agreed to build containment dams for waste.¹⁰¹

BELOW: Tailings from the Ok Tedi copper-gold mine in Papua New Guinea pollute the Ok Tedi river into which they are dumped.



PHOTO: DETE SIEGERT



PHOTO: OXFAM AUSTRALIA

AUGA RIVER, PAPUA NEW GUINEA

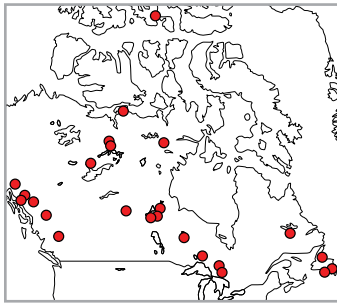


SINCE 1995, Petromin Holdings (and previously Dome Resources, DRD Gold, and Emperor Mines) has dumped over 160,000 tonnes of tailings per year into Iwu Creek at the Tolukuma gold mine. The Creek flows into the Auga River, which is also being impacted by the erosion of the mine's land-based waste rock dumps. Studies have found high mercury concentrations in fish that is attributed to the tailings. People living along the Auga River have reported that fish populations are devastated and the river is loaded with heavy sediment and difficult to cross. They have also indicated concerns over health conditions and unexplained deaths possibly attributable to contamination.¹⁰²

Although the national government of Papua New Guinea owns Petromin, the Central Provincial government has sought to stop the mine's operations in legal filings. After contaminated water apparently sickened several people in 2009, the Member of Parliament from the area called on the company to stop mining until tailings dams were put in place.¹⁰³ Community members have protested the mining operations and criticized the mine for a major cyanide spill that was caused by a helicopter dropping cyanide into a river, diesel fuel spills, unfair wages and worker conditions, and other negative social impacts.¹⁰⁴

ABOVE: Community members living near Tolukuma mine; Papua New Guinean girl urging coral reef protection.

CANADIAN LAKES

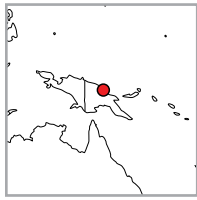


AN INCREASING number of mining companies are using or proposing to use Canadian lakes, streams and wetlands as mine waste dumps, mostly with constructed

containment dams. The impacts and proposals are spread throughout the nation's provinces and northern territories:

- ▶ In the Northwest Territories, Tyhee NWT Corp. plans to use Winter Lake for dumping at its Yellowknife Gold project.¹⁰⁵ BHP Billiton has dumped tailings into Long Lake at its Ekati diamond mine, where kimberlite ore and waste rock are acid-generating and acid rock drainage is leaching into groundwater.¹⁰⁶ The mine polluted a large area of tundra when it spilled more than four million liters of tailings from its system in May 2008.¹⁰⁷ At the nearby Diavik Diamond mine of Rio Tinto and Harry Winston, the tailings pond destroyed a small valley lake on the Eastern Island.¹⁰⁸
- ▶ In Saskatchewan, Golden Band Resources at its Jolu Central Gold mill is proposing to dump more than 200,000 tonnes of tailings per year into Mallard Lake, which was previously used as a tailings dump. The previous dumping between 1973 and 1997 had caused severe contamination in the water and sediments of Mallard Lake and downstream in the sediments and fish of Yew Lake.¹⁰⁹
- ▶ In Nunavut, Newmont subsidiary Miramar Mining Corp. plans to dump tailings into Tail Lake at its Doris North gold project.¹¹⁰ Agnico-Eagle Mines Ltd. is using the northwest arm of Second Portage Lake to dump 22 million tonnes of tailings over eight years and plans to turn Vault Lake into a mine pit for its Meadowbank gold project.¹¹¹
- ▶ In Ontario, Marathon PGM was considering the use of Bamooos Lake, an important lake trout ecosystem, for its copper and platinum tailings disposal. Local and national opposition has canceled that plan, but its other proposed alternative would still destroy a number of smaller lakes and streams. Near Sudbury, Xstrata owns the Strathcona mill that dumps some nickel and copper tailings into a portion of Moose Lake, and Vale operates the Copper Cliffs mine that is dumping tailings into the remains of Meatbird Lake.¹¹²
- ▶ In Newfoundland and Labrador, Vale (Voisey's Bay Nickel Company) plans to use Sandy Pond for dumping 381,000 tonnes/year of residue from its Long Harbour nickel processing plant. Canadian Fluorspar is planning on using Shoal Cove Pond, a coastal lake with brook trout and American eel populations, to dump its tailings from an industrial fluorspar mine site it is hoping to re-open at St. Lawrence.¹¹³ Teck has already destroyed Trout Pond and Gill's Brook tributary for its copper-zinc Duck Pond mine.¹¹⁴ Rio Tinto dumps around 30,000 tonnes per day of iron ore tailings (up to 23 million tonnes for over 40 years) into Wabush Lake at the Carol mine.¹¹⁵ Just south of Wabush Lake, Cliffs Natural Resources (Cleveland Cliffs) is dumping approximately 13 million tonnes of tailings annually into Flora Lake and tributary streams at its open-pit Wabush/Scully iron mine.¹¹⁶
- ▶ In British Columbia, Taseko Mines Ltd. (Hunter Dickinson) proposed to drain Fish Lake (Teztan Biny) and use the basin to store waste rock, and to turn Little Fish Lake and Upper Fish Creek into a tailings impoundment. The proposal was rejected by a federal environmental assessment in late 2010; the decision was consistent with a 2007 decision to reject the proposed Kemess North mine that would have dumped tailings into Duncan (Amazay) Lake. In June 2011, Taseko resubmitted a modified proposal that would still destroy Little Fish Lake, and though leaving Fish Lake intact would likely result in contamination of the lake by seepage from the tailings impoundment.

BASAMUK BAY, PAPUA NEW GUINEA



METALLURGICAL Construction Corp. of China and Highlands Pacific of Australia are seeking authorization to dump 5 million tonnes of tailings per year from the Ramu Nickel

mine into Basamak (Astrolabe) Bay of the Bismarck Sea. This bay is a prime fishing area. Local landowners are concerned the proposal will cause environmental destruction and irrevocably damage their traditional livelihoods.¹¹⁷ Communities in the area have opposed the project and hundreds of landowners came together to file lawsuits that temporarily stopped the dumping. However, in late December 2011, the PNG Supreme Court lifted the stay, giving the mining companies the green signal to resume dumping in the biodiversity-rich coastal waters. Local landowner plaintiffs in the case have faced persistent intimidation and have required police protection.¹¹⁸

The Ramu Nickel project is backed by the bank ANZ (a shareholder in Highlands Pacific)



PHOTO: JESSIE BOYLAN

and the China Export-Import bank, providing US\$ 560 million in finance.¹¹⁹

Marengo Mining of Australia has proposed a copper-gold mine near the Ramu Nickel site that would also dump tailings into Astrolabe Bay at a rate potentially five times that of the Ramu mine. The company is planning for the Yandera mine to begin operating in 2015. Marengo claims to be evaluating options for tailings and is still seeking US\$1.6 billion in financing to build the mine.¹²⁰

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BELOW: Basamak Bay , Papua New Guinea, is threatened by tailings dumping from the proposed Ramu nickel mine.

PHOTO: GDAMIAN BAKER





PHOTO: RANDI ANG

WHO'S DUMPING?

ABOVE:

Haul trucks
at the Batu
Hijau mine.

Few companies have ruled out dumping mine waste into natural water bodies, and several major mining companies continue the practice. Our investigation found that, in addition to several smaller companies, nine of the world's largest mining companies continue to this day to dump tailings into lakes, rivers, or the ocean. They are:

- ▶ Barrick Gold (Canada)
- ▶ BHP Billiton (Australia/UK)
- ▶ Freeport-McMoran Copper and Gold (USA)
- ▶ Goldcorp (Canada)
- ▶ Newcrest Mining (Australia)
- ▶ Newmont Mining (USA)
- ▶ Rio Tinto (UK/Australia)
- ▶ Teck (Canada)
- ▶ Vale (Brazil)
- ▶ Xstrata (Switzerland)

Only one major global mining company (BHP Billiton) has adopted policies rejecting dumping in rivers and the ocean and no major companies have policies in place to protect lakes from mine waste dumping. At least half of the companies that are members of the International Council on Mining and Metals (ICMM) are dumping or planning to dump tailings into lakes, rivers or the ocean.

BARRICK GOLD (ABX)

HEADQUARTERS: Toronto, Ontario, Canada

CEO: Aaron W. Regent

MAJOR EQUITY/SHAREHOLDERS: Capital World Investors, FMR LLC, Royal Bank of Canada, Market Vectors ETF, Blackrock Inc., Van Eck Associates Corp., Growth Fund of America Inc., Harris Financial Corp., Tradewinds Global Investors, Capital Research Global Investors.

2010 NET INCOME: US\$3.3 billion

2010 SALES: US\$10.9 billion

2010 ASSETS: US\$33.3 billion

MARKET CAPITALIZATION: US\$50.9 billion

NUMBER OF EMPLOYEES: 16,733¹²¹

Barrick Gold operates the Porgera gold mine that dumps tailings into the Porgera and Fly Rivers in Papua New Guinea. Barrick dumped tailings into two lakes near the Eskay Creek gold mine in northwestern British Columbia.¹²² Communities in the area have opposed the project and hundreds of landowners came together to file lawsuits that temporarily stopped the dumping. However, in late December 2011, the PNG Supreme Court lifted the stay, giving the mining companies the green signal to resume dumping in the biodiversity rich coastal waters. Barrick is also embroiled in a lawsuit brought by the Provincial Government of the island of Marinduque in the Philippines. The suit seeks compensation for environmental damages and funds for environmental rehabilitation of Calancan Bay and two rivers on the island degraded by the Marcopper mine. Marcopper dumped around 200 million tonnes of tailings in Calancan Bay between 1975-1991.¹²³

BHP BILLITON (BHP)

HEADQUARTERS: Mebourne, Australia/London, UK

CEO: Marius Kloppers

MAJOR EQUITY/SHAREHOLDERS: FMR LLC, Eaton Vance, Wentworth, Hauser, & Violich, Fidelity Diversified Intl. Fund., Fisher Investments Inc., Northern Trust Corp., Wellington Mgt. Co., UBS AG, Davidson Kempner Capital Mgt. LLC, Vanguard Specialized Energy Fund

2010 NET INCOME: US\$12.7 billion

2010 SALES: US\$52.8 billion

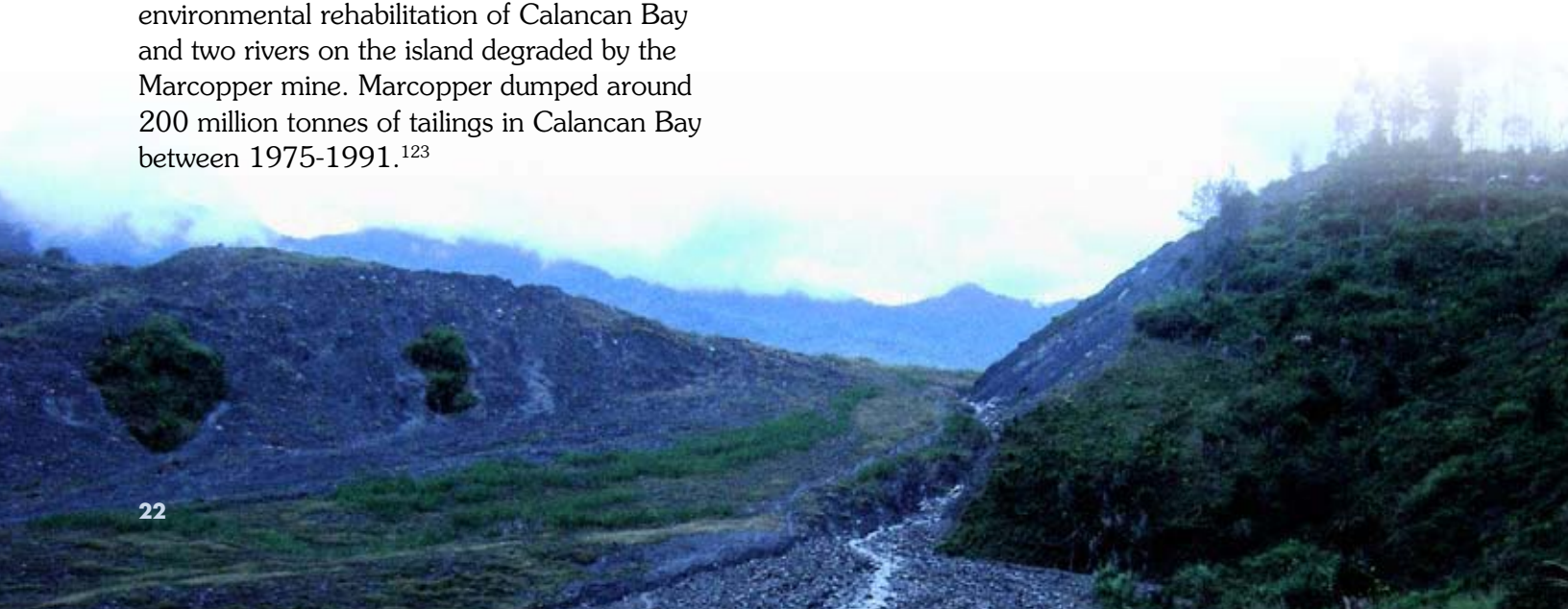
2010 ASSETS: US\$98.3 billion

MARKET CAPITALIZATION: US\$256.2 billion

NUMBER OF EMPLOYEES: 39,570¹²⁴

BHP Billiton owns and operates the Ekati diamond mine in the Northwest Territories in Canada, where it dumps kimberlite tailings into Long Lake. The company also previously owned the Ok Tedi mine in Papua New Guinea, which dumps tailings into the river, and the Island Copper mine in Canada, which dumped tailings into the ocean. BHP Billiton also owns part of Mineração Rio do Norte (MRN), which previously dumped bauxite mining waste into Lake Batata in Brazil. The company has a stated policy against dumping tailings or waste rock into the ocean or rivers.¹²⁵

BELOW: Riverine tailings disposal at Barrick Gold’s Porgera Mine in Papua New Guinea.



FREEPORT MCMORAN (FCX)**HEADQUARTERS:** Phoenix, Arizona, USA**CEO:** Richard Adkerson**MAJOR EQUITY/SHAREHOLDERS:** State Street Corp., The Vanguard Group, Inc., FMR LLC, BlackRock, JP Morgan Chase & Co., Price (T. Rowe) Associates Inc., Growth Fund of America Inc., Bank of New York Mellon Corp., Ameriprise Financial Inc., Marsico Capital Management.**2010 NET INCOME:** US\$4.3 billion**2010 SALES:** US\$18.9 billion**2010 ASSETS:** US\$29.4 billion**MARKET CAPITALIZATION:** US\$52.1 billion**NUMBER OF EMPLOYEES:** 39,200¹²⁶

Freeport McMoran dumps tailings into the Otomina and Ajkwa Rivers at its Grasberg copper and gold mine in West Papua, Indonesia.

.....
BELOW: Forest destroyed by the Ok Tedi mine's flooding and tailings dumping.

GOLDCORP INC. (GG)**HEADQUARTERS:** Vancouver, British Columbia, Canada**CEO:** Charles A. Jeannes**MAJOR SHAREHOLDERS:** Fidelity Management and Research LLC, Royal Bank of Canada, BlackRock, Van Eck Associates, Harris Financial Corp., Market Vectors ETF, TD Asset Management, CIBC, Greystone Managed Investments, Caisse de Depot et Placement du Québec.**2010 NET INCOME:** US\$1.6 billion**2010 SALES:** US\$3.8 billion**2010 ASSETS:** US\$28.8 billion**MARKET CAPITALIZATION:** US\$44.6 billion**NUMBER OF EMPLOYEES:** 3,140¹²⁷

Goldcorp constructed a tailings impoundment over a small lake at its Musselwhite gold mine in northwestern Ontario. It was also a principal partner in the development of the Mt. Milligan Mine in northern British Columbia, where the current owner, Thompson Creek Metals, is planning to dump wastes into a stream and wetland. Goldcorp remains a minority shareholder in the project.

NEWCREST MINING (NCM)

HEADQUARTERS: Melbourne, Australia

CEO: Ian Smith

MAJOR SHAREHOLDERS: Vanguard International, Nuveen Investment Trust, MFS Research Intl. Fund, Fidelity, McLean Budden Ltd., Invesco Gold & Precious Metals Fund, ING Equity Trust, Northern Multi-Manager Intl. Equity, Riversource VP Pyramis, Franklin.

2010 NET INCOME: US\$546.6 million

2010 SALES: US\$2.8 billion

2010 ASSETS: US\$6.2 billion

MARKET CAPITALIZATION: US\$30.8 billion

NUMBER OF EMPLOYEES: > 1,300¹²⁸

Newcrest now owns the Lihir gold mine in Papua New Guinea, which dumps tailings into the Bismarck Sea. Newcrest is also considering dumping copper mine tailings from Namosi, Fiji, into the Koro Sea.

BELOW: Panguna mine discharge pipes, Bougainville, Papua New Guinea.

NEWMONT MINING (NEM)

HEADQUARTERS: Greenwood Village (Denver), Colorado, USA

CEO: Richard T. O'Brien

MAJOR SHAREHOLDERS: Capitol World Investors, State Street Corp., The Vanguard Group, BlackRock, Growth Fund of America, Tradewinds Global, FMR LLC, Van Eck Associates, New Perspective Fund, Market Vectors ETF.

2010 INCOME: US\$2.3 billion

2010 SALES: US\$9.5 billion

2010 ASSETS: US\$25.7 billion

MARKET CAPITALIZATION: US\$28.5 billion

NUMBER OF EMPLOYEES: 15,500¹²⁹

Newmont Mining and its partners are dumping mine tailings into the Indian ocean off the island of Sumbawa in Indonesia. The company is also planning lake dumping at Doris North in Nunavut, Canada, and is planning to destroy several lakes and wetlands with waste rock dumps at its controversial Minas Conga project in Peru.¹³⁰ Previously, Newmont dumped tailings in Buyat Bay, Indonesia, at its controversial Minahasa Raya mine.¹³¹



PHOTO: DAMIAN BAKER

RIO TINTO (NYSE: RTP; LONDON: RIO)**HEADQUARTERS:** London, UK/Melbourne, Australia**CEO:** Tom Albanese**MAJOR SHAREHOLDERS:** Growth Fund of America, Ishares MSCI, Aberdeen Global, Vanguard International, Fundamental Investors, American FDS, College Retirement, Artio International Equity, Bernstein.**2010 NET INCOME:** US\$14.3 billion**2010 NET SALES:** US\$56.6 billion**2010 ASSETS:** US\$112.4 billion**MARKET CAPITALIZATION:** US\$139.3 billion**NUMBER OF EMPLOYEES:** 76,894¹³²

Rio Tinto's operations dump gold and copper mine tailings into the Ajkwa River at Grasberg, West Papua, into the Cassidaigne Canyon in the Mediterranean Sea, and into Carol Lake near its iron ore mine in Labrador, Canada. The company is also a major partner of the Diavik Mine in Canada, which destroyed a small lake for the construction of its tailings pond. Rio Tinto was previously involved in dumping into the Jaba river at the notorious Bougainville copper-gold-silver mine in Papua New Guinea and in dumping into the Bismarck Sea from the Lihir gold mine. Through its subsidiary Alcan it was involved in dumping of bauxite residue into Lake Batata in Brazil as well.¹³³

TECK (NYSE: TCK; TORONTO: TCK.A)**HEADQUARTERS:** Vancouver, British Columbia, Canada**CEO:** Don Lindsay**MAJOR SHAREHOLDERS:** BlackRock, Royal Bank of Canada, Fidelity Management and Research, I.G. Investment Management, Greystone Managed Investments, Harris Financial Corp., Mc Lean Budden Ltd., CIBC, TD Asset Management, UBS Global Asset Management.**2010 NET INCOME:** US\$1.9 billion**2010 SALES:** US\$9.3 billion**2010 ASSETS:** US\$28.8 billion**2009 MARKET CAPITALIZATION:** US\$31.6 billion**NUMBER OF EMPLOYEES:** 9,100¹³⁴

Teck is dumping copper and zinc tailings into Trout Pond in Newfoundland and Labrador in Canada. The company previously dumped tailings into Garrow Lake at its former Polaris lead-zinc mine on Little Cornwallis Island in Nunavut, Canada. Teck had previously considered dumping into the ocean at its Petaquilla mine in Panama. Teck is also developing marine mining in partnership with Nautilus.¹³⁵

BELOW: Panguna mine, Bougainville island, Papua New Guinea.



VALE (VALE)

CEO: Murillo Ferreira

HEADQUARTERS: Rio de Janeiro, Brazil

MAJOR SHAREHOLDERS: Government of Brazil (majority of voting shares), BlackRock, Lazard Asset Management, Ishares MSCI, Price (T. Rowe) Associates, The Vanguard Group, Wentworth, Hauser, and Violich, Baillie Gifford and Co., State Street Corp., Schroder Investment Mgt. Group, Goldman Sachs.

2009 NET INCOME: US\$12.5 billion

2009 SALES: US\$412.8 billion

2009 ASSETS: US\$108.7 billion

MARKET CAPITALIZATION: US\$102.8 billion

NUMBER OF EMPLOYEES: 68,187¹³⁶

Vale is proposing dumping into Sandy Pond at its Long Harbour nickel processing operations in Newfoundland and Labrador, Canada. Vale currently dumps tailings from its Copper Cliffs mine in Ontario into the remainder of Meatbird Lake, which once teemed with trout, and into what used to be lakes at its Thompson mine in Manitoba. The company is involved in the Goro nickel project, which had proposed ocean dumping in New Caledonia before switching to a conventional tailings dam, and dumped tailings into Lake Batata at its Mineração Rio do Norte (MRN) mine in Brazil.¹³⁷

XSTRATA (LONDON: XTA)

CEO: Michael (Mick) Davis

HEADQUARTERS: Zug, Switzerland

MAJOR SHAREHOLDERS: Glencore International AG, Black Rock Inc., Harbor International Fund, Vanguard International, Ivy Funds, Artio Global Management, IShares, Van Eck Associates Corp., Capital Research, and Dimensional Fund Advisors.

2010 NET INCOME: US\$4.9 billion

2010 SALES: US\$30.5 billion

2010 ASSETS: US\$69.7 billion

MARKET CAPITALIZATION: US\$48.5 billion

NUMBER OF EMPLOYEES: 38,561

Xstrata dumps nickel and copper tailings from the Strathcona mill into a portion of Moose Lake in Ontario. The company has also dumped zinc and copper tailings from its Matagami mill into what used to be Lake Watson in Quebec.¹³⁸



CONCLUSION AND RECOMMENDATIONS

PHOTO: CHARLES ROCHE

ABOVE: The Misima mine, now closed, dumped tailings off the in Papua New Guinean coast.

WATER IS OF GROWING IMPORTANCE in a world where climate change impacts, including droughts, are increasingly noticeable and human population will likely reach 9 billion people by 2050. Freshwater resources are critical to human and ecosystem survival but are increasingly threatened by depletion and pollution. The ocean and its resources are also under unprecedented and unsustainable pressure from direct contamination such as oil spills, overharvest, and through climate change and acidification from greenhouse gas emissions.¹³⁹

The mining industry must share the collective responsibility to protect water and aquatic ecosystems, and the communities that rely on them, especially since mining produces such large quantities of toxic waste. Tailings have destructive impacts on natural water bodies and the ecosystems and people dependent on them.

Companies and governments must adopt a precautionary approach to disposal of tailings and ensure that mining operations do not place tailings or other mine waste into natural bodies of surface water, including rivers, streams, lakes, wetlands, and intertidal, estuarine, and marine ecosystems.

There are several options companies could adopt that are safer for communities and the environment, including in areas where high rainfall and seismic risk make conventional tailings disposal behind dams too risky:

- ▶ *Produce less waste.* In some cases, a mining company may prefer to build an open-pit mine that produces a large quantity of waste, but could instead build an underground mine that targets the ore more precisely and produces less waste that can be more responsibly managed.¹⁴⁰ The Kemess North, now Kemess Underground project in British Columbia, Canada, is such an example.¹⁴¹
- ▶ *Dry stacking and backfilling.* Removing most of the water from tailings can allow mining operations to dispose of them in a dump that, if lined, covered, and reclaimed properly, is less likely to cause water contamination and threaten surrounding areas with dam failure accidents. Putting waste rock and tailings, as thickened paste, back into the pits or underground workings of mines may be a relatively responsible means of disposing of waste that reduces the mine footprint as long as operators account for pollution and accident risks.¹⁴²
- ▶ *Not mining.* Some places are simply not appropriate for mines. One criterion for assessing whether or not a location is appropriate for mining is if the mine operation can safely store wastes on land. Mines should not be built where it is not possible to responsibly store the waste on land. Recognizing this fact may mean less new production of some metals. However, increased recycling, more efficient use, and reduced consumption of metals can make up for reduced production. To compensate for not providing any new local mining jobs in less developed areas, sustainable development projects through international cooperation can work to improve quality of life in line with community aspirations and goals. Sustainable development can provide livelihoods over a longer term compared with the relatively short lifespan of mines and reduce the health and

environmental risks associated with the mining industry.

Governments, in turn, should take more proactive steps to protect water resources from tailings dumping. Two loopholes in the U.S. Clean Water Act, a law that was passed to protect water from industrial pollutants, allow mining companies to dump toxic mine waste untreated into rivers, lakes, streams and wetlands. Governments should close loopholes and create a regulatory environment that puts the health of our water and ecosystems over corporate profits by prohibiting this unnecessary practice.

Governments must only permit mining operations that protect our oceans, rivers, streams and wetlands from mining pollution and provide full financial guarantees to cover the cost of clean up, remediation, and restoration of tailings storage areas. There is also a need to close the “governance gap” where international companies can exploit lax regulations and weak government enforcement in the global south. The governments of countries such as the USA, UK, Canada and Australia that are home to most of the major international mining companies must make their companies accountable for the risks they pose to the ocean, rivers, and lakes wherever those companies are operating or seeking to operate. Collectively, governments must also advance proposals to better protect natural water bodies from contamination by mine waste through the Law of the Sea and other means. Scientists and consultants must continue to do more research on the impacts of tailings dumping at existing sites and on the alternatives to dumping.

For too long, mining operations have used our oceans, lakes, rivers, and streams as dumping grounds for their wastes. This is no longer a tenable option. In order to protect community and ecosystem health, mining companies must end the practice of dumping into natural water bodies. We simply cannot afford to lay waste to the planet’s most precious resource: water.

EndNotes

- 1 The United States sent 120 tonnes of municipal waste to landfills in 2009. U.S. Environmental Protection Agency. 2009. Municipal solid waste in the United States. <http://www.epa.gov/osw/nonhaz/municipal/pubs/msw2009rpt.pdf>
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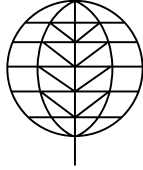
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