



MINING IN ONTARIO

A deeper look

Acknowledgements

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I V E Y f o u n d a t i o n



Executive Summary

The economic opportunity for new mines in northern Ontario is clear. Global demand for minerals has been soaring, and there's a tremendous opportunity to create new jobs and economic opportunities. In Canada, Ontario has been a leader in mining for almost a century; responsible for one-third of Canada's total mined metal production.

Significant mineral finds, such as the "Ring of Fire", and recent court cases supporting Aboriginal and treaty rights with respect to mining activity, make it a critical time for a greater understanding of the environmental and social impacts of mining in Ontario. For many communities, mining holds attractive potential for economic benefits in the short-term. However, it is also important to understand what mining means in the long-term for northern ecosystems and community health and prosperity. While the life of a mine can last a few years, the footprint it leaves on the land can be permanent.

This report provides an overview of the mining process and related environmental and social impacts to support dialogue on land use decisions in northern Ontario. It also summarizes resources available to help communities engage in the planning processes associated with mineral exploration and mine development.



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Overview of Ontario's Mining Industry

In 2011, there were 33 operating mines in Ontario¹. Approximately two-thirds of these were gold or base metal (iron, nickel, lead and zinc) mines, with a palladium and a diamond mine also in operation.

The rest of Ontario's mines are mainly located in the southern part of the province and produce minerals such as silica, gypsum, talc and salt. Figure 1 shows the breakdown of mines in Ontario.

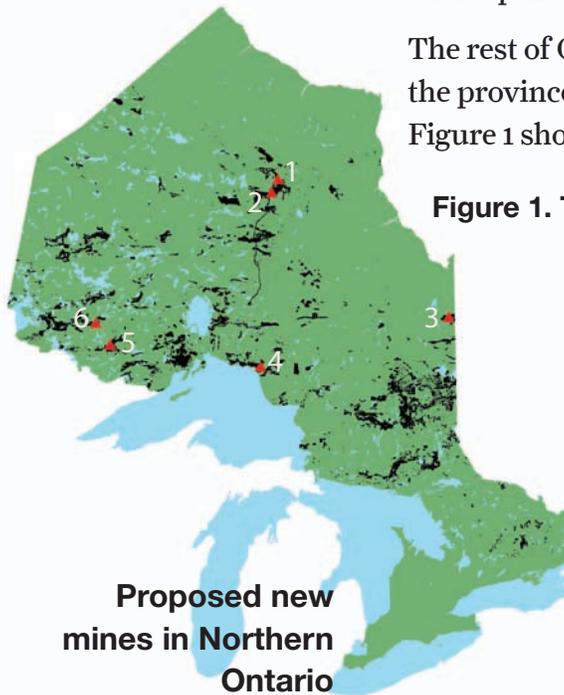
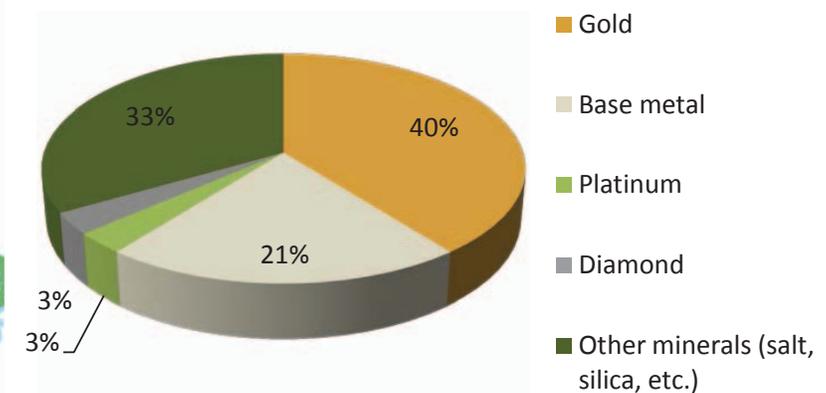


Figure 1. Types of mines operating in Ontario (MNDMF 2011)



1. Cliffs Chromite Mine (Cliffs Natural Resources)
2. Eagle's Nest Metal Mine (Noront Resources Inc.)
3. Detour Lake Gold Mine (Detour Gold Corp.)
4. Marathon Copper Mine (Stillwater Canada Inc.)
5. Hammond Reef Gold Mine (Osisko Hammond Reef Gold Ltd.)
6. Josephine Cone Iron Mine (Bending Lake Iron Ore Group Ltd.)

The "Ring of Fire"

The Ring of Fire is a recent mineral find, consisting of one of the world's largest chromite discoveries. It is located about 500 kilometres northeast of Thunder Bay. The deposit has attracted international attention from the mining industry and is estimated to be worth about \$30 billion. International mining companies have staked 9,000 claims covering 480,000 hectares². The Ring of Fire also includes significant nickel and copper deposits.

Demand for chromite is high worldwide, particularly in countries like China, which is the largest consumer (50% of global production) of ferrochrome, an alloy made from chromite used to produce stainless steel³.

The consequences of the scale of industrial development proposed in the Ring of Fire are huge. Over the next 10 years, the infrastructure needed to develop the mineral resources in the Ring of Fire could open up a vast area of northern Ontario through air, rail and road links to future mineral and other kinds of resource development.

Due to the location of the find, remote First Nations communities will experience most of the social and environmental impacts from this project. Raising awareness of the implications of large-scale development is important. Once development is approved in the Ring of Fire, change will come fast to Ontario's northern communities.



Tailings pond, Elliot Lake, Ont.

The Ontario Mining Association estimates the life of a mine as follows:

- Staking and Surveys: 1-2 years
- Basic Exploration: 3-4 years
- Advanced Exploration: 5-10 years
- Development and Production: 20 years
- Closure and Rehabilitation: 2-10 years
- Monitoring: 5-100 years

In 2006, Ontario recorded 66,926 new mining claims (MNDM 2011).

ramps as well as other underground infrastructure and the ratio of waste rock to ore generated tends to be much lower⁷.

The total volume of waste rock generated will depend on the scale of the project but mid-size projects typically generate several hundred million tonnes of waste rock.

Kidd Mine mine near Timmins, Ont. includes both an open pit and deep underground operations — in fact it's the deepest mine in the world.

Life Span of a Mine

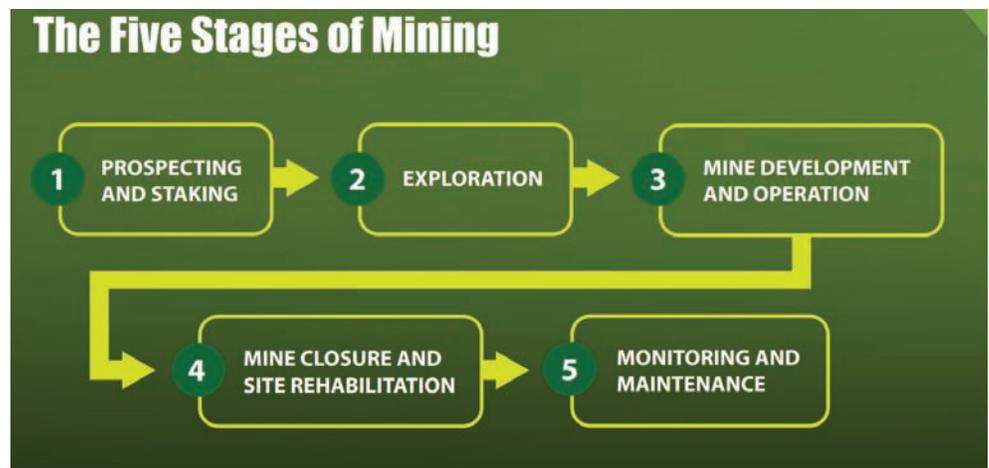
The average operating life span of a mine in Canada is relatively short, generally lasting between 15 and 20 years. However, the entire process of opening and closing a mine requires activities that might continue over hundreds of years.

Approximately 15 to 20 years, and 100 years or more for the entire process of opening and closing a mine requires activities that might continue over hundreds of years.

This includes the up-front work to find and develop suitable mineral deposits (the chances of a mining claim developing into an operating mine are estimated to be around 1 in 10,000⁸) and the long-term monitoring and remediation that are often needed to avoid environmental contamination once a mine site has closed.

The set of activities that describe the different stages of mining is called the mining sequence. It is helpful to understand the mining sequence, as each part of this sequence comes with different demands on communities and the environment. Figure 2 below shows the phases of the mining sequence that will be explained in following sections.

Figure 2. The mining sequence



The Mining Sequence (Stages of Mining)

1. Prospecting and Staking

Prospecting is the process by which minerals and metals are discovered. It often involves searching rock formations on the ground and/or geological data for clues about possible mineral deposits. If prospectors believe



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that an area is worth further geological investigation, they will stake a claim that gives them exclusive rights to do more work on the property in the hopes of finding mineral deposits that are valuable enough to develop a mine.

In Ontario, claims are usually staked on the ground using claim posts and by blazing lines on trees and the ground. Ontario now has map staking in some parts of the province as an intermediary step to online staking. Some provinces use online map staking, which

allows those who have prospecting licenses to claim exclusive mineral rights directly from their computers without ever setting foot on the property. Ontario is moving toward an online staking system over the next few years⁹.

In Ontario, the ownership of surface rights and mining rights are different from one piece of land to the next. Prospecting and staking are based on the “free entry system”. Free entry means that almost any area of open Crown Land can be staked, including land traditionally used by Aboriginal people and communities. Private property is also open to staking if the owner of the surface rights does not also hold the mineral rights on the property. However, the new *Mining Act* gives property owners in the “near north” the opportunity to request that their properties be off limits to staking. The province can refuse the request if it is deemed there is significant mineral potential. In southern Ontario, all private properties that didn’t have claims were closed when the new Mining Act was passed. As claims over private property in southern Ontario lapse, the property will be closed to future staking.

The concept of free entry assumes that mining should have priority over all other land uses. For this reason, a prospector or mining company can stake a piece of land without notifying or asking for consent from anyone who uses the land for other purposes (e.g., First Nations and Metis people, cottagers, recreationists). One of the problems with a free-entry claims system is that mining automatically takes priority over lands that may have other important economic, cultural or environmental values.

Some exceptions to free entry and areas that cannot be staked include:

- Land on an Indian Reserve;
- Land in a registered plan, subdivision or town site;
- Provincial parks or other protected areas; and
- Land already staked by another prospector or mining company

Historically, the government recommended (but did not require) that companies communicate their intentions when undertaking preliminary exploration activities near Aboriginal communities.

Mine closure is the last stage of the mining cycle. In Ontario, a mine closure plan describes the activities required to convert an operating mine to a closed site that is environmentally stable and will not present any future safety or environmental hazards.

2. Exploration

Once a claim has been staked, exploration begins. Exploration determines whether there is enough ore of good quality to make it worth developing a mine. Historically, the government recommended (but did not require) that companies initiate contact when undertaking preliminary exploration activities near Aboriginal communities. However, under Ontario's new *Mining Act*, this will be a requirement.

There are two levels of exploration — preliminary and advanced. Preliminary exploration can involve the following activities¹⁰:

- Ground surveys;
- Airborne surveys;
- Limited stripping and trenching (removal of vegetation and soil up to 10,000 m³, with a lower threshold if within 100 m of a water body);
- Limited bulk sampling (removal of large quantities of ore up to 1,000 tonnes from the surface);
- Various forms of drilling to remove rock samples from deep in the rock; and
- Trail, road and water crossing construction.



Mining exploration camp.

In advanced exploration, activities such as more extensive trenching, stripping, bulk sampling, and the construction of underground access tunnels may occur. De-watering of underground tunnels may also be necessary, which involves the removal or draining of ground or surface water from a mine site by pumping or evaporation. The construction of more permanent access routes may be required and the construction of more substantial buildings and camps usually happens at this stage (many early exploration sites have basic camps especially in remote areas).

During advanced exploration, an area may be permanently altered because of the leveling of the site, removal of vegetation and soil, and drainage associated with construction¹¹. The *Mining Act* is limited in its regulation of some of these potentially damaging activities. For instance, surface stripping that displaces less than 10,000 m³ or extraction of less than 1,000 tonnes of material from the ground is not considered advanced exploration under the *Act*. Therefore no closure plan that describes how the landscape will be restored is required. The new

exploration permits will require a description of what will be done to remediate a site.

The environmental effects of exploration can include:

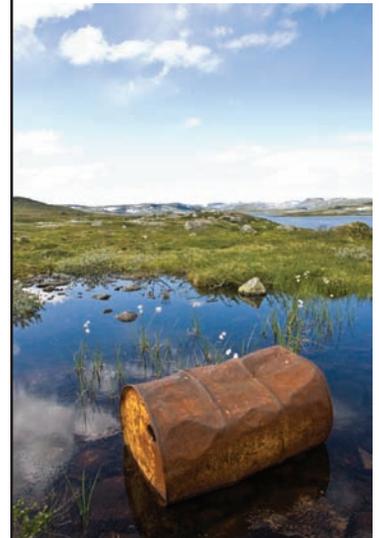
- The loss of options to protect culturally or environmentally important lands from development;
- Trail/road and trenching erosion, which can lead to water and soil quality issues;
- Disruption of wildlife habitat as well as harvesting and fishing activities;
- Contamination from fuel, hydraulic fluids, garbage and sewage;
- Noise pollution; and
- Acid mine drainage, where exposure of certain minerals in rocks creates acidic runoff from a mine site.

Exploration activities are often done by smaller “junior” companies that raise money from investors that bet on a company finding a potentially valuable deposit. These companies are not very stable and may only last a few years before they go bankrupt, re-form themselves or are bought by another company. Projects are also often bought and sold between companies. Most junior companies do not have ambitions to open a mine, hoping instead to “sell up” their claims and potential project to a buyer that can take it to another level. This is a challenging reality for communities that are trying to engage with the industry as efforts put into building positive relationships can be rendered futile when a project is sold.

3. Mine Development and Operation (Mining and Milling Phase)

If feasibility studies show that mineral extraction is possible and economically worthwhile then a mine may be built. This is the mining and milling phase during which operations consist of the following activities:

- Mine construction (also known as pre-production);
- New roads and power corridors for remote mines;
- Stripping/storing of soil and vegetation overburden;
- Ore extraction;
- Crushing or grinding of ore;
- Flotation or chemical concentration of ore;
- Mine and surface water treatment; and
- Storage of waste rock and tailings.



Johns Morten

Exploration activities may leave behind waste and contaminants.



Cyanide vat: Cyanide may be used to separate minerals from ore.

Environmental effects of the mining and milling stage can include:

- Contamination of surface water and groundwater;
- Increased erosion and sedimentation of lakes and streams;
- Wildlife and fisheries habitat loss;
- Heavy metal leaching from acid mine drainage;
- Changes in local water balance;
- Potential acid generation from waste rock and pit walls;
- Noise and windborne dust; and
- Lands and forests covered by waste rock piles and tailings disposal areas (land alienation).

The Timmins Kidd Creek site stores 100 million tonnes of base metal sulphide tailings in a pile that is 1.2 kilometres wide and 25 metres high.

The waste site is surrounded on three sides by Porcupine River tributaries (www.tailings.info).



Tailings disposal at Kidd Creek Mine.

The concentrated ore that has been separated from the tailings is usually transported offsite for further concentration or smelting.

Milling – Extracting Ore

The milling process that is used to extract valuable minerals from the ore can require the use of large amounts of poisonous substances, such as sodium cyanide and sulfuric acid. Cyanide is commonly used to separate gold from the host rock. The problem with the use of these chemicals is that they can be acutely toxic to humans and wildlife. Fish and aquatic invertebrates are particularly sensitive to cyanide exposure if it gets into streams or lakes. Cyanide is toxic to many living organisms at very low concentrations¹². Freshwater fish are one of the most cyanide-sensitive groups of aquatic organisms. Hazards to fish, wildlife and livestock are well documented. Massive kills of freshwater fish by accidental discharges of cyanide wastes are not uncommon¹³.

In one case, cyanide-containing mine effluents from a Canadian tailings pond released into a nearby creek killed more than 20,000 steelhead¹⁴. In the 1990s there was a spill from one of the Hemlo mines that impacted the drinking water source for the Pic River First Nation.

Tailings Ponds – Storing Mine Waste

The crushed rock, water and chemicals that are left over from milling create a sludge called “tailings.” Tailings include the materials that remain after the valuable portion is separated from the uneconomic portion of an ore. Profitable concentrations of minerals range from 5% for base minerals to .00005% for precious metals such as gold. This means that, generally speaking, a minimum of 95% of the processed ore becomes tailings waste¹⁵.

Tailings represent the most significant long-term environmental liability created by mining projects. Because of the extreme hazard they present to human health and the environment, tailings need to be contained and are usually kept on site as tailings ponds. Tailings ponds often require clearing more land to hold mine waste than the rest of the mine combined. The failure of containing structures (tailings dams) that hold this waste can result in a massive release of toxic tailings material.

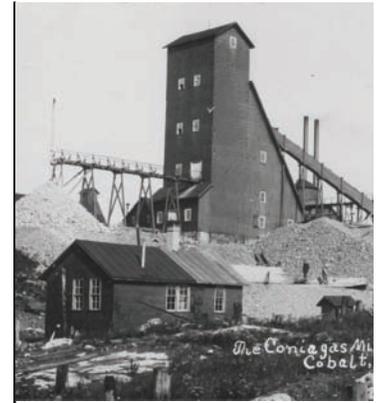
Although major dam failures do not occur often in Canada, the potential for environmental damage is significant when they do. A tailings dam failure in near Matachewan in 1990, for example, released over 195,000 cubic metres of tailings and washed out 1.5 kilometres of highway. A large portion of the tailings were released into a nearby creek leading to the Montreal River¹⁶. Other recent examples in Canada are a failure of a tailings dam near Chapais, Que., release of mercury tailings into Pinchey Lake in British Columbia, and a tailings spill at Ekati diamond mine in the Northwest Territories.

One example of a large tailings disposal facility is the Kidd Creek Metallurgy site owned by Falconbridge near Timmins, Ont. The site processes copper and zinc ore. The Kidd Creek mine includes a disposal site that stores more than 100 million tonnes of base metal sulphide tailings. The tailings pile is 1.2 kilometres wide and 25 metres high. The site is surrounded on three sides by Porcupine River tributaries, increasing the potential for significant contamination of fish-bearing waters if the containment structure fails.

Improperly maintained tailings ponds can also result in a slow, ongoing release of pollutants into the environment that may go undetected if tailings ponds are not monitored regularly. As such, they are of great environmental concern¹⁷.

For example, more than 80 years of silver mining around Cobalt, Ont. has led to widespread contamination of water with arsenic¹⁸. Metal leaching from mine wastes in the area has led to the contamination of parts of the watershed, with dissolved arsenic concentrations much higher than what is allowed by law in drinking water (e.g., exceeding Canadian drinking water criterion of 0.025 mg/L¹⁹). Repeated exposure to arsenic can lead to long-term liver, kidney, and central nervous system damage. In this case, the mine is owned by a large, profitable mining company – Agnico Eagle.

A 2005 report by the Environmental Commissioner of Ontario noted that about half the closed mine sites that require regular follow-up inspections had not been inspected in over five years.



Coniagas Mine, Cobalt, Ont.

More than 80 years of silver mining in the Cobalt, Ont. area has led to widespread contamination of water with arsenic. Repeated exposure to arsenic can lead to long-term liver, kidney, and central nervous system damage (www.environmentalhealth.ca).

There are several issues with assurances. Is the amount sufficient? Are the assurances transparent? And should a company be allowed to “self assure”? Essentially, should we assume that large companies are unlikely to fail? And, has there been an independent review of the closure costs?

As with operating mines, one of the biggest challenges in mine closure is to protect the water around the mine site. While rehabilitating the surface of an old mine may be re-shaped, buildings removed, topsoil added and grass planted – the key concerns are what is going on underneath the surface and the long-term integrity of tailings impoundments.

Forecasting mine site reclamation costs is an inexact science and costs associated with long-term maintenance, like the costs required for water management, can be substantial²³. Problems arise when the mining company is no longer operating or goes bankrupt. If the financial assurance is not enough to cover the cost of mine closure and reclamation, the government is forced to pay the difference. Since 2002, Canada’s federal, provincial and territorial governments have spent close to \$1 billion to manage the 10,000 plus abandoned sites across Canada and prevent new ones²⁴. In Ontario, the government spent \$88 million between 1999 and 2008 to rehabilitate the highest priority abandoned mine sites at the taxpayers’ expense²⁵.

5. Monitoring and Maintenance – Continuing Upkeep

Almost all mines will require ongoing monitoring, maintenance and/or water treatment. Some will require monitoring for generations beyond the actual closing of the mine. A monitoring program (usually developed by the company and approved by government) is used to assess how well reclamation measures are working after a site is shut down and also to identify corrective actions where needed²⁶.

The length of the monitoring phase is reviewed when the mine closes and depends on the potential impacts and risks to the environment. If the site needs long-term care and maintenance, the mining company remains responsible for the site, including remediation of any additional environmental issues arising after closure. In theory, Ontario can take back a mine site from a solvent mine lease holder but so far this has never happened.

Problems arise when a closed mine site remains so hazardous that it requires monitoring forever. As with any industry, mining companies come and go, which raises the question of who will be responsible once the mining company is gone?



Acid mine drainage.

PennState



Tailings pond at Elliot Lake, Ont.



When fish are exposed directly to compounds from acid mine drainage through their gills, they may suffocate from acute toxicity. Chronic effects tend to impact reproductive and digestive functions.

A 1996 panel report by the Canadian Environmental Assessment Agency²⁷ on how to manage uranium mine tailings near Elliot Lake, Ont. illustrates the potential lasting nature of a mine's legacy long after it has stopped production: "Given the permanent nature of the hazards presented by the tailings, the panel recommends that an adequate containment system must be supported in perpetuity by effective care and maintenance programs."

Experiences in Ontario with the failure of tailings containment structures and the inherent difficulty of predicting long-term environmental impacts (for example, on water quality), means that no mine can simply be walked away from.

Just like mine development, mine closure also has impacts on a community. This includes the loss of jobs and income used to support the growth of a community while the mine was operating. It also has a direct and indirect impact on local employment, businesses, and the sale of goods and services. Communities need to consider how mine closure will affect not only the health and local environment but also the social structure of the community after a mining operation's end.

Environmental Impacts of Mining

A single mine is the centre of a web of development that includes the construction of roads, power-generating facilities and transmission lines, impoundment areas, and dams. The energy used by the mining industry represents 7% of Ontario's industrial electrical power use²⁸. Cliffs' proposed ferrochrome production plant required for their proposed Ring of Fire development would be the single largest user of electricity in the province, equivalent to a city of 350,000 people. Mining can permanently change the character of the landscape in a number of ways, from strip-ping and flooding productive lands, to limiting opportunities to pursue other land-based activities.

The Impacts of Mining on Waters

Some of the worst environmental offenders from the mining industry in Canada have left water bodies so polluted that they are unfit for human use and cannot sustain healthy ecosystems. In British Columbia, the Mt. Washington Mine near Comox produced copper for only three years but since then, toxic copper leachate has been contaminating the headwaters of the Tsolum River for decades²⁹ and ruined a multi-million dollar salmon fishery. As a result of local citizens' efforts, restoration activities, although very costly, have been able to bring back some of the salmon

population. Some of the effects of mining on water are documented in the following sections.

Acid Mine Drainage

Acid mine drainage has been identified as the biggest environmental liability facing the Canadian mining industry and is estimated at \$2 to 5 billion³⁰. The possibility, severity and timing of acid mine drainage can be very hard to predict, which makes it difficult to plan for mitigation of impacts.

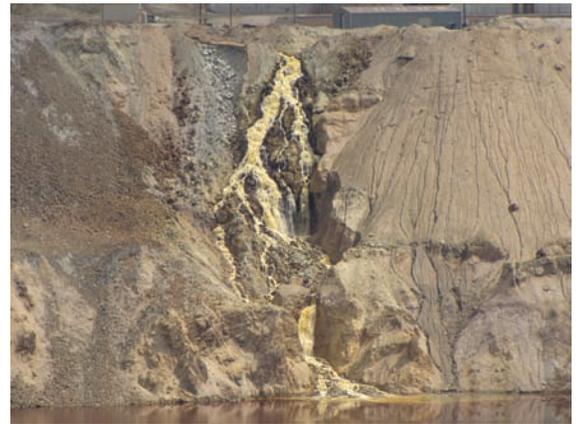
Acid mine drainage occurs when waste rock or tailings that contain sulphides are exposed to oxygen and water to generate sulphuric acid. The chemical reactions dissolve heavy metals from the rock and combines with the acids, which produces a toxic mixture. Acidic runoff from these rocks into local streams and lakes can have devastating impacts on aquatic life. As water acidity increases, the number and abundance of fish, macroinvertebrates (e.g. crayfish, snails, clams) and aquatic insects decrease. The metals may have acute or chronic toxic effects on aquatic organisms, many of which are more sensitive to metals than humans.

The abandoned Britannia copper mine in British Columbia has been releasing acid mine drainage into local waters for many years. A 2000 study of the mine's impacts compared fish abundance, distribution and survival at contaminated and non-contaminated areas³¹. Chum salmon fry abundance was significantly lower near the impacted waters. The investigators also reported that acid mine drainage from the Britannia Mine was toxic to juvenile chinook and chum salmon. A costly rehabilitation program has now brought this largely under control.

Although there are a number of ways to reduce the development of acid mine drainage and treating mine effluents, there are no technologies that allow a company to close a mine and walk away from it. In most cases, any mine that exposes metal sulphide-bearing rocks will need to be monitored and potentially treated for hundreds of generations after the last miner has worked there. It could take hundreds to thousands of years for some sites to become "acid neutral" and stop leaching into the environment³².

Toxins and Heavy Metal Pollution

Many acid rock discharges also contain elevated levels of toxic metals like nickel and copper, with lower levels of a range of other compounds like arsenic, manganese, lead, and aluminum. This occurs because as the



Ron Schott

Acid mine drainage.

Where mixing zones have not been approved, or discharge levels have been exceeded, charges can be laid, but this generally does not happen. For example, there were 50 breaches of established water pollution thresholds by the mineral sector in northern Ontario in 2005 but no convictions. An examination of the provincial database of environmental exceedances is telling. In 2010, one Ontario mine exceeded the acute lethality test on trout 12 times.

Some of the processes for de-watering mines (like those used in the De Beers Victor diamond mine) flood areas that naturally contain mercury and convert it to a highly toxic form called methyl mercury. Methyl mercury affects the central nervous system and, in severe cases, irreversibly damages areas of the brain³³.

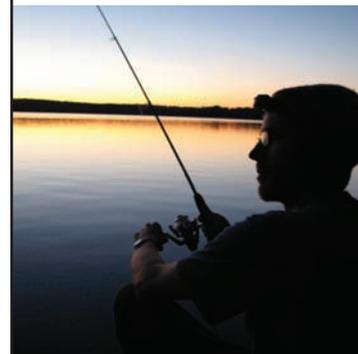
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Recently, the Mushkegowuk Environmental Research Centre has been sampling fish in the Albany and Attawapiskat Rivers and finding higher than normal levels of methyl mercury³⁴. As a result, Ontario's Ministry of the Environment changed its fish consumption advisory for a stretch of the river near the mine – an important First Nations' fishery – to four meals a month, from the previous eight. This is just one example of how mining can have far-reaching effects beyond the actual boundaries of a mine site.

Sediments and Turbidity

Most mining activities (including exploration activities) like soil stripping, trenching, road building, ore extraction and others, can lead to the release of soil and sediment (fine soil particles) into nearby streams and lakes. Water quality and aquatic habitats can also be affected by increased amounts of sediment in the water column and settling on streambeds.

When it is suspended in the water column, sediment can cause tissue rot or even directly kill fish. When sediment settles it can smother fish eggs and aquatic plants that can decrease both reproductive and survival rates for affected species. Increased turbidity, where light that is unable to penetrate the water due to suspended particles, can decrease water temperatures and make it hard for fish to locate food.



Travis Pritchard

Fish sampled in the Albany and Attawapiskat Rivers by the Mushkegowuk Environmental Research Centre showed high levels of methyl mercury and led to an advisory to reduce fish consumption.

The Victor mine ore contains about one diamond for every 100 tonnes of material excavated from the open pit mine (Ontario Technologist, Volume 52, No. 3 May/June 2010).

The Impacts of Mining on Lands

Mining Waste

The actual footprint of many mine sites will continue to endure, even after reclamation efforts have been undertaken. An open pit mine site may be as large as 5,000 hectares; however the actual footprint of a mine, including areas impacted by exploration and de-watering, can be as much as 300,000 hectares or 600,000 soccer fields.

Mining is one of the least efficient extractive industries in Canada. Of all of the material removed from the ground by a typical Canadian mine, 42% is immediately rejected as waste rock. Of the remaining 58% nearly all of it – 96% – is turned into slag and toxic tailings. Only 2% of what is removed from the ground can be converted into value.

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All told, over the course of a given mine's life, it may produce hundreds of millions of tonnes of waste, much of which will remain hazardous in perpetuity due to the risk of acid mine drainage and heavy metal pollution.

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Soil Contamination

The process of producing metal from its ore is called smelting. Smelting represents another layer of potential environmental impacts associated with mine productions. Emissions from smokestacks have improved greatly since the days when Sudbury, one of Canada's foremost ore processing locations, was also considered one of the most polluted cities in North America. That being said, smelters and blast furnaces continue to release airborne pollutants from smokestacks.

Mercury, lead, benzenes, arsenic, chromium, lead, manganese, dioxins, furans and a number of other highly toxic compounds are released and end up settling in predictable plumes downwind of the release points. Once in the soil, some of these toxins are taken up by vegetation and can then move through the food chain becoming more concentrated through the process of bioaccumulation. Bioaccumulation is the increasing con-

The mining sector is the fourth largest industrial water user in Canada, requiring about 1.7 billion cubic metres of fresh water per year – roughly half of the entire volume of Lake Nipissing, Ontario's fifth largest lake.



centration of toxic substances (such as pesticides, or other organic chemicals) as it moves up the food chain. As the highest on the food chain, humans eating contaminated wildlife or plants will have the highest concentrations of toxins in their body tissues.

Another concern is the impact of fuel spills at exploration sites. It is unclear how often fuel spills at exploration sites go unreported as these usually occur in remote areas that have little to no regulatory oversight. Although companies are required to document and clean up fuel spills, 2010 anecdotal accounts of fuel drums lost in bogs at an exploration site near McFauld's Lake indicate that large spills may not always be properly reported.

Cutting up the Land ("Landscape Fragmentation")

In Ontario's boreal region, access roads and transmission lines that serve remote mines cut through the forest and interrupt the landscape. Biologists call this "landscape fragmentation" because it divides the continuous forest landscape into smaller pieces.

See Figure 3 for an example of the changes to the land that often occur when roads and transmission lines are opened in previously hard-to-reach areas.



Area fragmented by roads, clearcuts, mine sites, etc.

Fragmentation reduces the quality of forest habitat for wildlife and provides travel corridors for predators like wolves. This interferes with normal predator-prey relationships and increases the chances that wolves will catch prey species like deer, moose and caribou. Fragmentation also increases access for human predators, which can lead to increases in hunting and fishing pressure.

Landscape fragmentation is the primary reason for the loss of Ontario's woodland caribou populations, a species that tells us about the overall health of the boreal forest. There are also clear relationships between building accessible roads in the boreal forest and the decline of other species like lake trout. As far back as 1991, a Ministry of Natural Resources report made the link between the decline in the lake trout population from overfishing in Ontario, among other factors³⁵. The level of fishing in a particular lake is directly linked to how accessible it is by road or other means.

Often the larger-scale impacts from mining occur indirectly, from activities such as road-building and infrastructure development (hydroelectric dams, transmission lines, etc.). Experience in Ontario suggests that building roads into the forest tends to have a multiplier effect. One road creates many new access points, which in turn attracts

Figure 3. The cascading impacts of roads



Illustrations: Tim Yearington, courtesy CPAWS Wildlands League

New roads can be the beginning of bigger landscape changes. They open the way for resource development, including logging and mining, and increase human use and presence on the landscape. They become pathways for predators like wolves and for invasive species. Once use is established, it becomes difficult to control or limit access to previously remote fisheries or hunting sites. Meanwhile, species from songbirds to caribou that require undisturbed forest disappear from what is now a puzzle-piece landscape.

more use and further fragments an area. The competition for resources between users becomes more intense and puts pressure on wildlife and fish populations. Once a road is built, it is very difficult to get public support to close the road once the original use is finished. A mine may be in production for only 15 years but the irreversible and long-term impacts of fragmenting land for mining are rarely considered.

Foreclosing Other Land-Use Opportunities

The most intrusive aspect of mining on the land base may be the huge area of land that is reserved for mining but never actually developed.

However, even when mineral development results in economic growth, the benefits are not always shared equitably and local communities closest to the source of mineral development can suffer the most after a mine closes and stops producing revenue. In the longer term, communities exposed to fast-paced resource development can experience the following negative social impacts:

- Increase in crime and antisocial behaviour;
- Change to community social character and identity;
- Strained relationships and family breakdown from time spent away;
- Increased cost of living;
- Decreased community cohesion and attachment; and
- Economic downturn following mine closure.

Compared with other major mining areas of Canada, Ontario has the lowest return to government for the value of minerals produced (1.5%) from the mining tax. Of the limited amounts paid on the value of mineral production, none of it is targeted to northern communities to support infrastructure development and maintenance or deal with negative social impacts.

The readiness of communities for the change in lifestyle that sudden economic development brings is something that should also be considered as part of understanding the impacts of a mining project.

Frequently Asked Questions: Tools to Protect Lands and Waters

Often communities and citizens near mining operations who are concerned about their health and the environment don't know where to go to find reliable information and resources. Below are some examples of tools, resources and strategies that are used by some communities to protect their lands and waters.

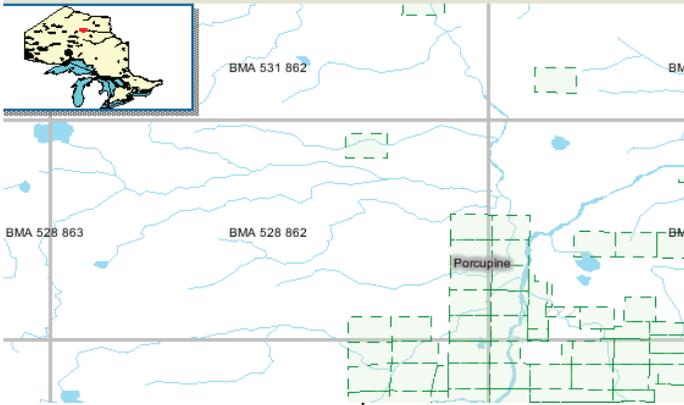
Where is exploration happening?

Ontario's CLAIMaps

Too often, people don't know until after they have been stripped of vegetation, drilled and explored, that areas they use regularly have been designated for mining. If you have concerns about an area, contact the claim holder sooner rather than later to improve the chances that sensitive areas or those with important cultural values can be protected. The Ontario government has a catalogue of current mining claims that can be

Methyl mercury contamination in fish, along with fish consumption advisories, have the potential to disrupt people's eating habits, fishing traditions, and the livelihoods of people involved in the capture, distribution, and preparation of fish (The Science of the Total Environment 259 (1–3): 23–9).

After a series of mine closures in Elliot Lake, Ont., domestic disturbances tripled, weapons use and demand for social services increased, and student enrolment dropped. The community's overall wellbeing was "seriously and negatively affected." (2008 "Boom to Bust" report by the Pembina Institute)



seen online in a database called CLAIMaps (see Resources below).

Property owners, recreationists, First Nations, Metis and others are advised to check CLAIMaps regularly to see if areas important to them have already been staked and registered with the government. Where there is an owner of the surface rights, the claim holder must give only one day's notice before starting work on a claim. The new *Mining Act* will require companies to file exploration plans and request permits that

could increase the transparency and accountability around exploration and requires Aboriginal consultation. The details, however, remain to be determined.

Concerned individuals should request that they be given advanced notice of any work done on the land or any change to the status of the claim including the transfer to another individual or company. If you encounter difficulties with the claims holder or can't get the information you need, ask your Member of Provincial Parliament (MPP) for help. (To find your MPP, visit the Elections Ontario website.) Call, write, fax or send an email to your MPP describing the problem. You can also contact your regional Mining Recorder.

How can I get involved prior to mine development?

It is important to engage in a mining project at the earliest phase possible. A project will gain momentum the further along in the mining sequence it gets. Establishing concerns to be addressed or trying to stop a project is much easier at the earliest stages of a project.

The Environmental Assessment Process

Mine development projects often trigger environmental assessment requirements under both the *Canadian Environmental Assessment Act* (CEAA³⁷) and the *Ontario Environmental Assessment Act*. The type of

An environmental assessment (EA) is a process to predict and minimize the environmental effects of development projects before they are carried out. The sooner communities are involved in an EA, the better the chances of influencing the outcome.

Resources

Find your Member of Provincial Parliament at Elections Ontario:

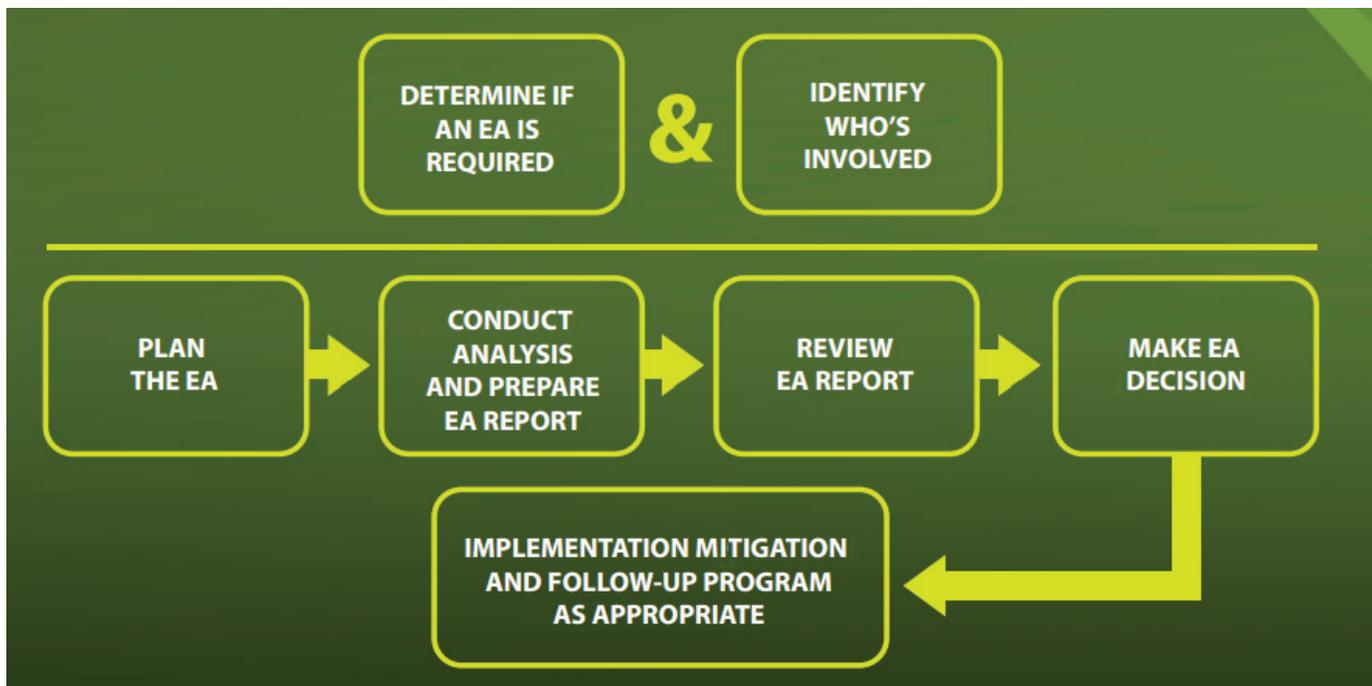
fyed.elections.on.ca/fyed/en/form_page_en.jsp

Find mining claims in your area at the CLAIMaps website:

www.mndm.gov.on.ca/mines/claimaps_e.asp

Find your regional Mining Recorder: www.infogo.gov.on.ca

Figure 4. Environmental assessment process (Source: Government of Canada)



Other important steps include developing a Draft Terms of Reference, consultation and finalization of the Terms of Reference.

environmental assessment usually depends on the kind of “regulatory trigger” (in other words, what kind of development activity is being proposed). However, the new *Canadian Environmental Assessment Act* will not have triggers; instead, it will have a project list.

The EA process can either be simple or very complicated, depending on the type of project. It can take the form of a simple screening of company documents or it can involve detailed research and extensive hearings. It can be carried out at the provincial level, the federal level or both. For example, Cliffs’ proposed chromite mine in the Ring of Fire is in the early stages of an EA under both the federal and provincial *Environmental Assessment Acts*³⁸.

Ontario, however, doesn’t automatically require the application of the *Environmental Assessment Act* to mining projects. Various elements of a mine may be subject to the *Act*, but a complete evaluation of a mining project is not required because the province maintains that it is a private project and that there is no provincial “decision” to allow a mine to go ahead – it assumes a mine will go ahead providing it meets the technical permit requirements. This is an unusually regressive stance and is unique in Canada.



Rigorous ongoing monitoring is crucial to minimizing environmental impacts.

Recently major mining projects have voluntarily submitted themselves to the *EA Act* as this gives them the advantage of reducing consultation requirements during more detailed technical permitting phases.



Serdar Uckun

Caribou are very sensitive to habitat disturbance.

Ideally, every EA is designed to be a participatory public process where First Nations and stakeholder concerns can influence the outcome. In some cases, groups can apply for government funding to participate in the federal EA process (see Resources listed below). However, it can be very challenging for individuals, groups or communities to access the resources or technical expertise needed to successfully represent themselves in a complex EA process.

Citizens should not rely on an EA to run its course and deliver the safeguards they seek if they are not actively involved in the process. Concerned individuals can participate by attending open houses and sharing their ideas, submitting comments to the EA agency, participating in public hearings should there be any, and encouraging others to do the same.

What can be negotiated directly with mining companies?

Independent Monitoring Agreements

A common concern regarding mining operations is the quality of environmental monitoring that occurs, public access to monitoring reports and the transparency of information related to spills, contamination, water chemistry, impact to wildlife and other environmental and safety hazards. As pointed out by Ontario's Environmental Commissioner, the province has fallen short in the past regarding the proper monitoring of closed mine sites³⁹.

Resources

[First Nations Environmental Assessment Toolkit](#): Provides information and advice to help First Nations participate effectively in EA processes.

[List of Environmental Assessment Projects](#): Ontario Ministry of the Environment's website links to a current list of projects going through an Environmental Assessment in Ontario.

[Canadian Environmental Assessment Registry](#): Directory allows a search of environmental assessments by geographic location.

[Participant Funding Program](#) (includes the Aboriginal Funding Envelope): May provide financial support to individuals, non-profit organizations and Aboriginal groups interested in participating in federal environmental assessments.

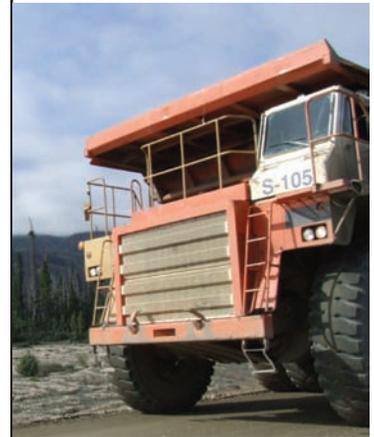
Over the last 40 years there have been many changes to the way mining companies operate. Some companies have worked with local communities to develop and finance independent monitoring agencies to oversee various aspects of the mine operation. One example of a monitoring agreement includes the Ekati Diamond Mine's Independent Environmental Monitoring Agency. The 1997 Environmental Agreement was negotiated to deal with concerns not covered by legislation and regulations and was signed by three parties: BHP Billitons Diamond Inc., the Government of Canada and the Government of the Northwest Territories. Its purpose was to provide independent third-party monitoring of the mine.

Impact Benefit Agreements

An Impact and Benefit Agreement (IBA) is a contractually binding agreement made between a community and a company that provides Aboriginal consent or support for a project to proceed⁴⁰. The agreements have been the principal means by which impacts on Aboriginal and treaty rights are dealt with. Though none have been signed in Canada there is also an example of an IBA-like agreement with a non-indigenous community in the United States – Stillwater's Good Neighbor Agreement. These agreements can also be known by other names: participation agreements, benefits agreements, etc. The name often just depends on what a mining company and a community choose to call their agreement. Although each agreement is unique, most cover issues like profit-sharing, capacity building, jobs, infrastructure development and considerations for environmental and cultural values that may be affected by mining.

Since 2005, there have been at least four agreements signed between De Beers and several Mushkegowuk communities along James Bay for the Victor Mine including⁴¹:

1. IBA with Attawapiskat First Nation;
2. Working Relationship Agreement with the Taykwa Tagamou Nation;



Travis S.

Jobs training and employment are important benefits for local communities.

Resources

[Independent Environmental Monitoring Agency](#): Information on the BHP Billiton Ekati™ Diamond Mine Independent Monitoring Agency in the Northwest Territories.

[Stillwater and Sweet Grass Counties' Good Neighbor Agreement with Stillwater Mining Company](#): Describes the partnership between citizens in Stillwater and Sweet Grass counties and the Stillwater Mining Company, which operates two platinum/palladium mines in the area.

Total value of payments in 2010 to eight communities associated with two De Beers mines in Canada was around \$5.2 million.

Total value of diamonds sold by De Beers in 2010 was approximately \$446 million (2010 De Beers report).

3. IBA with Moose Cree First Nation; and
4. IBA with Kashechewan and Fort Albany First Nations.

It is difficult to assess exactly how well these agreements are working because many of the terms are confidential. However, a review of IBA case studies by the Canadian Business Ethics Research Network that relied on interviews with community members said the following about the Attiwapiskat agreement:

“...the community had great success in securing employment opportunities during the construction phase of mine development, but since operations began in 2008 it has been a struggle to educate, train, and retain local workers for positions that require industrial certifications and advanced training.”

The review also found that:

“The difficulty of hiring highly-skilled professionals to fill important roles in the community, has impacted the First Nation’s ability to take full advantage of the IBA, and led to frustration within the community.”

In February 2009, an 18-day community blockade was staged in protest of the terms of the IBA. The roadblock was established when local frustrations erupted as community members felt De Beers was not living up to the terms of the IBA.

The resolution of divergent rights – the right to explore or develop a mine versus the community’s right to manage its traditional territory – remains an issue in several regions of Canada⁴². Some First Nation communities who have found mining companies unresponsive to their concerns have been forced to assert their rights in court.

Aboriginal people in Canada have unique constitutional rights, which require that they be consulted and that reasonable steps be taken to accommodate their concerns should a development project infringe on these rights. Legal action is preferably the last resort as it tends to be expensive, time- and resource-consuming and can be divisive within and between communities.

See IBA Resources on the next page.

Mine Closure Plans

Companies are required to post their draft closure plans for public comment. Information based on Part VII of the Ontario *Mining Act* and enabling regulations on how to review and comment on a mine closure plan is available as a [PDF file](http://www.canaryinstitute.ca/publications/Ontario_Closure_Brochure.pdf) (2005) at www.canaryinstitute.ca/publications/Ontario_Closure_Brochure.pdf

Resources

[IBA Case Studies - Canadian Business Ethics Research Network](#): Reviews the results of specific agreements between Ontario First Nations and mining companies.

[Impact Benefit Agreements Community Toolkit](#): An excellent resource describing how to negotiate an IBA agreement with a mining or resource extraction company.

[Dealing Full Force: Lutsel K'e Dene First Nation's Experience Negotiating with Mining Companies](#): Describes one Aboriginal community's experience with mining negotiations.

[The Aboriginal Mining Guide](#): A handbook for negotiating lasting benefits for Aboriginal communities.



Kitchenuhmaykoosib Inninuwug Case Study

In 1999, the community of Kitchenuhmaykoosib Inninuwug (KI) in northern Ontario discovered that Platinex Inc. had staked claims on their territory without notifying them. After several years of dialogue, the community asked the company to suspend development until land-use planning that considered all potential land uses had been completed and the community was properly consulted. Platinex continued to drill, maintaining that their claim gave them rights to continued exploration despite community land claims. On March 18, 2008, Ontario Superior Court Judge Patrick Smith sentenced Chief Donny Morris and five other council members from KI to six months in jail for obstructing exploration on their land. In 2009, Platinex received \$5 million plus mediation for ceding their claim to KI Lands. In March 2012, Ontario withdrew 23,181 square kilometres from mineral exploration and development⁴³.

Resources

[Mining companies, First Nations clashing over Ring of Fire](#): 2012 article about conflicts between First Nations and Ring of Fire proponents.

[Kitchenuhmaykoosib Inninuwug website](#): Gives background on the KI mining conflict.

[West Moberly First Nations v. British Columbia](#): A precedent-setting case confirming that the Government of British Columbia has an obligation to ensure that incremental intrusions, including mining, on the habitat of an at-risk-species (caribou) do not deprive a First Nation of its Treaty Rights.

[Wahgoshig First Nation v. Her Majesty the Queen in Right of Ontario et. al](#): The Ontario Supreme Court recently sent a message to proponents seeking to engage in mining activities on First Nations' Treaty lands: public consultation and accommodation with affected First Nations must occur before such activities begin.

How can I monitor mines already in operation?

The National Pollutant Release Inventory

For citizens concerned about mines already in operation, Environment Canada maintains a self-reporting inventory of pollutants released to the water, air and land for industries across Canada. The National Pollutant Release Inventory (NPRI)⁴⁴ provides information on over 400 pollutant materials including potential health effects from exposure and best available current information on safe exposure thresholds.

Data on the kind and amount of toxic substance released from smelters and ore-concentrating facilities can be found in the NPRI. A recent legal challenge also forced the federal government to collect and report data on the toxic pollutants in waste rock and tailings areas. Among the pollutants released from the mine through on-site disposal are ammonia, arsenic, cadmium, copper, lead, mercury and others.

The Metal Mining Effluent Regulations

The Metal Mining Effluent Regulations (MMER) were registered on June 6, 2002 under subsections 34(2), 36(5) and 38(9) of the *Fisheries Act*. The MMER apply to all Canadian metal mines (except placer mines) with an effluent flow rate in excess of 50 cubic metres per day that were in commercial operation, under development or reopened after the day the Regulations were registered.

The MMER require metal mines to report on the presence of a number of substances in mine effluent. These reporting requirements apply to arsenic, copper, cyanide, lead, nickel, zinc, total suspended solids and radium 226, as well as pH and acute lethality. Comprehensive reporting is also required to address the environmental effects monitoring provisions of the Regulations. It is important to note that the MMER require reports of releases of only a limited number of NPRI substances to water.

Reports on compliance with the MMER are available from Environment Canada. Data on environmental effects monitoring is not being made publicly available at this point. MiningWatch is challenging Environment Canada on this.

Most mines have sewage discharge permits. Compliance reports are found at www.ene.gov.on.ca/environment/en/industry/compliance_and_enforcement/environmental_compliance_reports/index.htm



savethewildup

The end of mining does not mean an end to environmental impacts.



Richard C. Bennett

Forest food sources need to be carefully monitored for contamination.

Ontario: Airborne Contaminant Discharge Monitoring and Reporting Regulation (for Smelter Discharge)

The Airborne Contaminant Discharge Monitoring and Reporting Regulation (O. Reg 127/01)⁴⁵ came into force in May 2001. Facilities in Ontario that meet the reporting requirements for air releases will be required to report emissions of any of 358 contaminants, from a wide range of industrial sectors, including metal, non-metal and coal-mining facilities. The Regulation (O. Reg 127/01) requires reporting of air emissions from all types of mining activities, including releases from tailing areas and road dust. As of 2005, all reports are available to the public through the NPRI.



Information on emissions from smelters is available through the National Pollutant Release Inventory.

Resources

[National Pollutant Release Inventory](#): Data on the kind and amount of toxic substances released from smelters and ore-concentrating facilities.

[Metal Mining Effluent Regulation – Factsheet](#): Department of Fisheries and Oceans factsheet describing the use of natural lakes for storing mine tailings in Canada.

[A Citizen's Guide to Airborne Contaminant Reporting in Ontario](#): The guide describes who is required to report airborne contaminants, what substances are reported, when the information must be reported, what is done with the reports and how the public can gain access to the reports.

Resources

[The Aboriginal Mining Guide](#)

A handbook for negotiating lasting benefits for Aboriginal communities.

[The First Nations Environmental Assessment Toolkit](#)

A toolkit that provides in-depth information about the environmental assessment process.

[Guidebook for Evaluating Mining project EIAs](#)

Helps grassroots advocates and communities understand mining environmental impact assessments (EIAs) and explore ways that proposed mining projects could be made socially and environmentally acceptable.

[The Good Neighbor Campaign Handbook](#)

A handbook on building constructive relationships with polluting companies.

[The IBA Community Toolkit](#)

A resource for First Nation, Inuit and Metis communities in Canada considering impact and benefit agreements with mining companies.

[Rehabilitating Abandoned Mines in Canada: A Toolkit of Funding Options](#)

Provides a basic understanding of financial options open to government officials who have the responsibility of managing abandoned mining hazards that have become the responsibility of the Crown.

[National Pollutant Release Inventory](#)

Provides information on over 400 pollutant materials including potential health effects from exposure and best available current information on safe exposure thresholds.

[Mine the Gap: Connecting Water Risk and Disclosure in the Mining Sector](#)

Includes a list of questions to ask about mining projects to understand how they will impact waters.

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