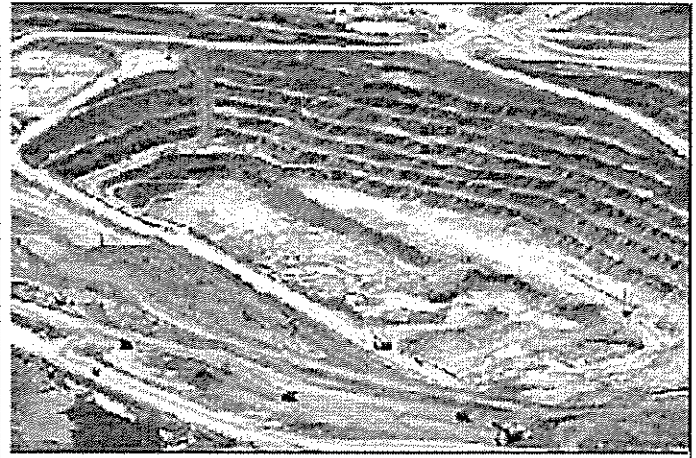
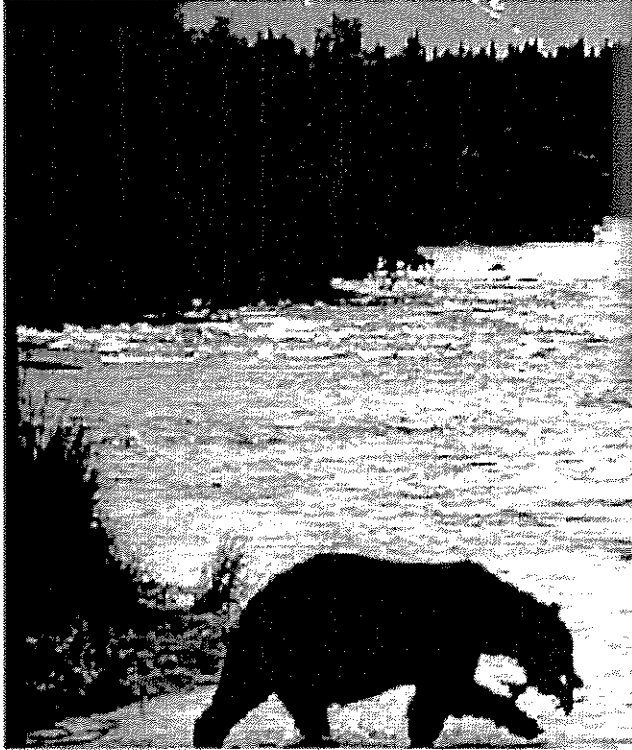


Mining in Remote Areas



Issues and Impacts

Environmental Mining Council of British Columbia

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What are the social and environmental impacts of mining in remote areas?

Full of relevant case studies and documentary coverage, this information kit serves as a detailed introduction to the particularly pressing issues raised by proposed mineral developments in areas like Canada's North.

Introduction

Produced by the Environmental Mining Council of British Columbia (EMCBC)
October, 1998



EMCBC is a coalition of local, regional, and national organizations working towards environmentally sound mining policies and practices.
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Introduction

Mine development brings with it the promise of a wide range of benefits.

The promoters of a new mine often point to the jobs that will be available, the power and transportation infrastructure that will be created, or the new tax and other revenues that will be generated.

For communities on the receiving end of mineral investment, however, there are also costs—potentially dramatic ones.

To contribute to the full assessment of potential impacts, communities, regulators, and media commentators need the context and information necessary to understand and weigh the issues.

This information kit has been designed to profile some of the major impacts associated with mines developed in remote areas.

In the past, development of mining projects in remote areas of Canada (e.g., the far north) has been limited by the costs associated with transportation and infrastructure. By definition, remote areas may be far from the nearest road or port and power grid. However, as older ore bodies are being depleted, mining companies are increasingly looking to develop deposits located in less accessible regions of the country.

The development of remote mines has implications for the often pristine environments, for the communities and people who live nearby or use the resources presently there, and also for the mine workers who will be employed at these remote mine sites. There are impacts asso-

ciated with every stage of mining, from exploration through to (and often beyond) closure.

Many of the impacts discussed in this package, such as water pollution and health effects, can occur at mines regardless of whether they are remote or not. There are, however, impacts that are specific to or more serious at remote mines, such as the impacts of roads and routes on pristine ecosystems and on the aboriginal communities whose livelihoods are linked to the health of these areas.

This kit is divided into four sections. The first deals with Environmental Impacts, highlighting issues such as the effects of roads on ecosystems, and the various sources of water pollution throughout the mining process. The second section, Community Impacts, addresses concerns related to the boom-bust nature of the mining industry, and how that affects economic and social stability of communities. Health and Safety deals with the dangers posed to workers in the mine environment, and broader community health impacts. The final section examines the role of Environmental Assessment in identifying and preventing or mitigating potential impacts.

In each section, summaries and references to relevant newspaper and magazine articles are included. Many of the articles are reproduced in an appendix at the end of the kit. Readers wanting a more detailed or technical discussion of impacts can refer to some of the sources cited.

Environmental Impacts

Mining is a high stakes game in which many uncertainties still exist. The investors, the workers, the community and the environment are exposed to a high level of risks. The question is, who benefits in the short term and the long term? Who really pays the price of development—the investors, the workers, the community or the environment?

The environmental impacts of mining can begin at the exploration stage, long before the first truckload of ore is hauled to the surface. Despite advances in technology the recent track record of mining highlights many serious risks and impacts for the people and the land where minerals are discovered.

This section focuses on the impacts associated with Exploration, followed by a look at some of the major sources of environmental impacts during the Mine Development stage.

Exploration: the Edge of the Sword

*"The geography and wildness of this land has shaped us all, it is a part of what it means to be Canadian and it must not be lost in a reckless rush for industrial resources." (1)**

The impacts from exploration tend to be spread thinly over a vast area because the initial stages of exploration primarily involve surveying large tracts of land to identify potential mineral deposits. Relatively few of the deposits identified during exploration are drilled, still fewer are drilled intensively to delineate the deposit, and in the end, only a small number of sites are ever developed into mines.

Although an individual exploration

operation may have little effect on its immediate environment, the cumulative effect of thousands of kilometres of geophysical grids cut through vegetation and surface soils can cause considerable erosion, sedimentation and wildlife disturbance.(2)

Recently, major discoveries of mineral deposits have sparked exploration rushes in the northern regions of Canada (3,4). For example, in the three years following the discovery of a major diamond deposit in 1990, more than 20 million hectares of land were staked in the Barren Lands of the Northwest Territories. This was more land than was staked there during the previous half century.(3)



Abandoned oil drums at exploration site, northern BC.

Environmental Impacts

Articles with underlined titles are available in photocopy form from the Environmental Mining Council of BC.

1 Deal reached to protect Arctic wilderness sites (Globe & Mail, 01/14/97, A4)

This quote comes from John Turner, ex-prime minister of Canada and legal representative for the World Wildlife Fund (WWF) of Canada. In 1997, the WWF applied to the Federal Court for a judicial review of the recommendations of the environmental assessment panel that granted conditional approval to the BHP's Ekati diamond mine, 300 km northeast of Yellowknife. The organization was concerned that the mine would be followed by several other developments in the Central Arctic. The WWF withdrew their request when an agreement was struck with the federal government, which, among other things, committed the government to develop a plan for protected areas free of future mining and other industrial projects.

2 Marshall, I.B. 1982. Mining, Land Use and the Environment: a Canadian Overview (Environment Canada)

3 Diamonds in the rough—BHP's mine in Canada's Barrens has the potential for causing big environmental and social disruption (Globe & Mail, 04/27/96, B1, B3)

Prospecting exploded after BHP discovered diamonds in the Northwest Territories. "So much exploration was taking place across the territory that local government offices ran out of metal tags for staking claims, while lumber yards couldn't keep up with the demand for two-by-two posts used to mark the corners of a claim."

Scientists worry the project will impact caribou calving grounds and migration paths. The fate of the herd and land claims battles were two of the central issues at the federal environmental and technical hearings held throughout NWT in February. At the hearings, scientists also pointed out that the draining of lakes will kill 300 to 500 species of fish and other aquatic life in five lakes

*Article numbers refer to references and summaries given in the side column.

Environmental Impacts

4

Raglan's success sparks exploration boom in Nunavik

(*Nunatsiaq News*, 07/30/98; <http://www.nunatsiaq.com/nunavik/nun80731.01.html>)

Due to the success of Falconbridge's Raglan operation, mining companies are rushing to Nunavik after more mineral-rich deposits.

5

Mineral exploration and development at Emish (Voisey's Bay): an introduction to the issues (1995)

This information comes from the Innu Nation's website, located at <http://www.innu.ca/voisey1.html>.

6

Diesel spill at Windy Craggy

(*Northern Miner*, 09/19/94, p. 16)

In 1994, there was an incident involving a spill of diesel oil from a storage tank at the Windy Craggy property in northwestern BC. The spill was not reported by property owner Geddes Resources; in fact, the company had to be informed of the spill by the BC Ministry of Environment, Lands and Parks.

7

Labrador miners accused of littering

(*Globe & Mail*, 12/19/95, B6)

The town council in Goose Bay says companies have abandoned thousands of fuel drums and propane cylinders across Labrador's countryside. They called on the Newfoundland government to stop mineral exploration companies from turning their region into a garbage dump. An environmental monitor for the Labrador Inuit Association reported five confirmed fuel spills, from barrels leaking into the ground to helicopters dropping drums into the sea. He warned that the problem could worsen. "After many of these junior companies come in and carry out a drilling program, when they pull out they'll leave their stuff on the land."

8

Diamond miners face environmental charges

(*Vancouver Sun*, 01/12/96, D16)

Two companies, BHP and Kennecott, face federal charges that their activities polluted water and disrupted fish habitat in their exploration areas.

Similarly, in Labrador, more than 250,000 claims were staked following the Diamond Field Resources Inc.'s Voisey's Bay nickel discovery (5). If even a small portion (e.g., 1% = 2,500) of these claims are actively explored, the influx of people and equipment into otherwise uninhabited or sporadically used areas (e.g., by First Nations) has the potential to greatly impact both the land and its inhabitants.

The possibility of large-scale industrial development (such as the construction of an on-site smelter, and associated roads and power lines) increases when a number of projects having a high potential to become producing mines are identified in a specific region. Among other things, the Innu are concerned that if development in their region proceeds, new projects such as the Donner prospect will become more attractive, while older prospects like the Strange Lake rare-earth metals deposit or the Brinex Kitts-Michelin uranium project, both initially abandoned for economic reasons, may become feasible.(5)

Unfortunately, the impacts of mineral exploration and development are too often considered in isolation. This issue will be discussed below in the Environmental Assessment section

Exploration Impacts Pollution

Pollution during the exploration stage can stem from a variety of activities and sources.

Fuels, oils and drilling fluids can spill or leak into soils (6) leading to contamination of vegetation growing on the site. Drilling can release natural fluids, such as brines and natural gas to the surface. These contaminants can be washed into or de-

posited directly into streams, rivers, lakes and seawater.(7) The improper disposal of wastewater and sewage at exploration camps can also pollute nearby streams. Subsequently, the wildlife, aquatic organisms and vegetation living in the polluted environment can be poisoned by these substances.

Underground exploration work ("bulk sampling") results in ore and waste rock being deposited on the surface. Drainage through these waste rock dumps or storage piles can be a continuing source of sediments, heavy metals and acid to local watercourses (these impacts will be discussed in detail in the subsection on Mine Development : Water Quality).

Clearing vegetation for rights-of-way and test drilling sites, removal of overburden, as well as the establishment of stream crossings can result in considerable damage to the soil. The resultant erosion can produce significant sedimentation of lakes and streams (8), which can disrupt fish habitat.

Disturbance of the Land

Disturbance can result from gridlines being cut through vegetation during soil, electromagnetic, magnetic and gravity surveys, and during drilling. The location of these gridlines usually does not reflect natural factors such as topography and vegetation. This damages more vegetation than if trails were to follow contours and bypass areas of particular natural importance. In the ecologically sensitive tundra of Labrador and the Arctic these scars can last for decades or more.

Exploration camps, set up to provide accommodations for workers, also result in soil and vegetation disturbance. The extent of those ef-

Case study: Innu and Voisey's Bay

"Innu concerns include illegal harvesting by survey workers, siting of exploration camps in areas of intensive Innu land use or cultural significance, and increased helicopter and airplane traffic over sensitive wildlife habitat or harvesting areas. Airborne geophysical surveys in Labrador involve flying transects (usually no more than 250-500 meters apart) over the claim block at altitudes of approximately 100 ft. above ground level. Innu hunters from Utshimassit (Davis Inlet) have already been overflown by survey helicopters in Sango Bay. In early May, both the Innu Nation and the Canadian Wildlife Service expressed serious concern over the impacts of aerial survey work on key wildlife, such as caribou and migratory birds. To date, nothing has been done to effectively regulate these activities to protect wildlife."(5)

fects, as well as problems associated with the disposal of garbage and human waste, will depend on the size and design of the camp.

Stripping of overburden to examine the underlying bedrock is usually accomplished by digging by hand, bulldozers, hydraulic means or blasting. In terms of area affected, bulldozing probably has the greatest impact.

Soil and vegetation disturbance can have significant impacts on wildlife. In 1994, exploration activities were occurring in an area of the Yukon known to be caribou calving and Dall sheep lambing grounds. This concerned local outfitter, Ron Hardie. "Stripping will reduce the fragile plants and grasses the sheep use; also access will disrupt the sanctuary nature of this ground."(9)

Gridlines and trails increase access into wilderness areas, often re-

sulting in poaching and hunting.(10) This, in turn, affects the people who traditionally relied on those wildlife populations for subsistence hunting purposes.

The noise that accompanies the operation of heavy equipment (e.g., drill rigs), motorized vehicles and aircraft also disturbs wildlife. Aircraft can cause wildlife disturbance on a much larger scale than land traffic because of their higher speed and their ability to pass over all types of terrain. As well, low-flying aircraft carrying sensing equipment such as a magnetometer or spectrometer can be a source of disturbance to animals. The amount of noise and disturbance they produce depends upon the frequency of flights, flying altitude and type of aircraft. Also important are the health, species and group size of the animals involved, as well as the time of year and vegetation cover.(11)

Mine Development: Rolling Back the Wilderness Frontier

The development phase of a mining project is the stage when the major disturbances related to mining occur.

The mining industry and Canadian government often portray min-

eral developments as having "small footprints," i.e., impacting only small areas of land. The mine site itself, however, is just one point in a long line of activity before and after the digging starts.(12) As the subsection on Access and Transportation

Environmental Impacts

9

Lake-area land use permit draws fire (*Whitehorse Star*, 09/25/94, p.4)

A contentious land-use application in the Yukon allowing Killer Gold to use heavy equipment in an area where a caribou herd is threatened, drew criticism from environmental groups and First Nations. The area is also a Dall sheep lambing area. Groups were angry that the federal government did not put the application through more a rigorous screening, which would have allowed for more public input.

10

Mining boom called bust for northern wildlife (*Vancouver Sun*, 04/20/90, B12)

Environmentalists and resource users (e.g., trappers) are worried that exploration crews damage trapping trails, disturb sensitive fur-bearing animals such as the fisher, and allow easy access by snowmobiles in winter. They warn that an increase in access will lead to an increase in poaching.

11

Ripley, E., Redmann, R.E. and Maxwell, J. 1978. **Environmental Impact of Mining in Canada** (Centre for Resource Studies, Queen's University). p. 21.

12

Environmental Mining Council of BC. 1998. **More Precious than Gold . . . Mineral development and the protection of biological diversity in Canada**

Prepared by the Environmental Mining Council of BC (EMCBC) for the World Wildlife Fund of Canada, this report outlines a number of myths related to the mining industry, and recommends a set of principles that could be put in place to protect endangered spaces from the potential impacts of mining operations.

This report can be obtained by contacting EMCBC (emcbc@miningwatch.org, ph: 250-384-2686).

Environmental Impacts

13

Support grows for deep-sea port at Bathurst Inlet

(*Nunatsiaq News*, 04/09/98; http://www.nunatsiaq.com/archives/nunavut98415/nvt80409_30.html)

The proposal for construction of a deep-sea port and an all-weather road from Bathurst Inlet to the south of Contwoyto Lake has been made to deal with the potential increase in fuel and supplies required to service new mines opening in the region. According to industry representative, Mervin Hempenstall, existing transportation infrastructure will be insufficient to meet the needs of the region's growing mining industry. The existing road is only open in the winter, and as Hempenstall says, "You've got a problem just trying to get the volume of fuel and supplies to service all the mines on the existing road. . . you can only get so many trucks on that road in the window it's open."

14

Finding common ground (*Up Here*, 1994, v.10(5), Nov/Dec – supplement)

This supplement addresses the questions: do diamonds offer solid economic benefits for Canada's North? And can they be mined responsibly in our fragile environment?

15

Mychasiw, L. and Hoefs, M. 1988. Access-related impacts of backcountry roads to wildlife and management approaches to mitigate them

(Department of Renewable Resources, Yukon Territorial Government)

16

Troubled waters: the Taku dilemma (*Globe & Mail*, 08/10/98, A10)

Redfern Resources, a junior mining company, is planning to build a 160-km road, "the first ever into the wilderness," and reopen an old mine from the 1950s.

There are fears that the road will open up the area for further development. "Already, mining companies that have been dormant for years are breathing

(Continued on page 7)

will show, mining operations can have far-reaching impacts.

Another favourite industry claim related to mining is that it is a "temporary use of the land." This, too, can be misleading. While it might be true that the mines themselves only operate for a short period of time, the impacts from these developments on water, soil, wildlife and communities can persist for decades and centuries.(12) This is especially true for impacts on water.

Access and Transportation: The Impact of Roads

When a mining development is proposed, one key concern relates to access: how will the employees, equipment, construction materials and processing chemicals be transported to the site, and how will the ore/minerals, employees and hazardous wastes be removed?

There are four options for transporting materials and employees: air, rail, water, and roads.

The concerns associated with transporting goods by air are primarily economic. It can be extremely costly to fly materials into a minesite, and flying out ore or ore concentrates is feasible only in rare cases, e.g. rich gold deposits. As well, there would be noise pollution associated with the planes, leading to disturbance of wildlife and human communities.

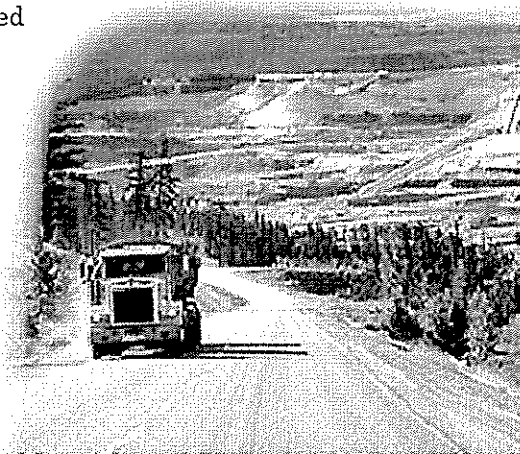
The alternative to transporting goods by air is to transport by truck,

rail or ship (or some combination thereof).

In remote northern areas many roads can only be used on a seasonal basis (i.e., in winter, when the surface is frozen). Recently, in response to the expected development of several diamond mines in the central arctic, a proposal was put forth to construct a deep-sea port at Bathurst Inlet, as well as an all-weather road from Bathurst Inlet to the south of Contwoyto Lake. The port's promoters say a northern supply route would make other potential mining projects in the region more viable by reducing transportation costs.(13)

Not everyone welcomes the prospect of roads encouraging further development. "There's much

talk about an all-weather road," comments Chris O'Brien, an environmentalist with Ecology North in Yellowknife. "Increased access leads to local depletion of animals. An all-weather road leads to other roads and gradually, it's opened up. You



Roads are the source of particularly severe environmental impacts.

hear people saying we've got to open up the north like it's some kind of can. The trouble is, once it's opened up, you can't close it down." (14)

The concerns voiced by various groups about the effect of roads on the environment are well founded. Some of the most significant direct and indirect impacts of mining result from the construction of exploration and mining roads.

Wildlife

There is a tendency for trails to be built laterally from initial access routes. While a network of trails may be a benefit for mineral exploration purposes, wildlife populations in the area become susceptible to overharvest, and the effects upon the landscape escalate in proportion to the amount of area covered.(15)

Every new road or trail in a wilderness area occupies space that was previously wildlife habitat. Some species have traditional migration patterns which, if interrupted, can lead to permanent abandonment of their range, a reduction of the population size through interference with sensitive calving grounds (3,9,16), or even the elimination of that particular group of animals.(15)

When the Omineca mine road was built in northern BC in the late 1970s, slash barriers along the road led fish and wildlife branch officers to dub it a 'moose trap'. There was also concern that the piled up slash was interfering with migration of caribou herds "as effectively as a barbed wire fence." BC Wildlife Federation spokesperson Les Storey cautioned, "when you break up a migration corridor for a herd of caribou, you're signing its death warrant." (17)

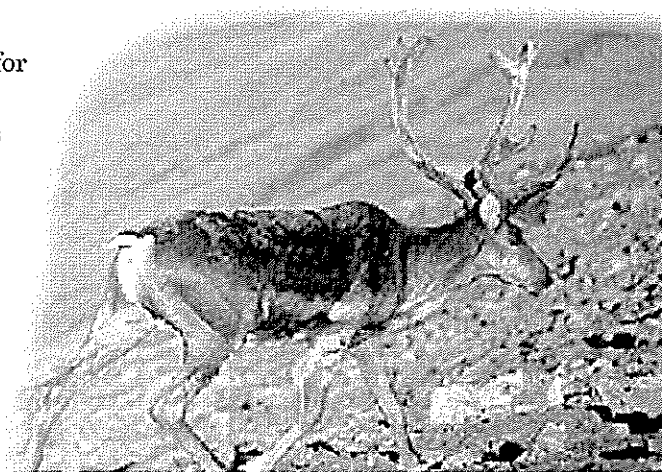
Roads are bad news for bears, too, because they disrupt bear movements by fragmenting their ranges, and because they introduce often-uncontrolled human disturbances into the area. The road slated to service Redfern Resource's Tulsequah Chief mine in northern BC has biologists worried. The historical pattern suggests

that if use of the road is not restricted to Redfern activities and is subject to unrestricted access by other users, as has been the case in many other mine developments throughout BC and North America, "bears will be killed by hunters, poachers and anyone else with a gun who perceives himself or his property to be in jeopardy," says bear expert Phil Timpany.(18)

One of the greatest worries for First Nations is that roads will increase access to traditional hunting areas, which would mean that subsistence harvesters would then have to compete with other users. The Taku River Tlingit First Nation, environmental organizations and the Alaskan government have serious concerns that a road to the Tulsequah Chief mine will lead to increased exploitation and/or destruction of the area's resources.(16,19)

Fish Habitat Destruction

Roads affect watercourses by introducing sediments and pollutants. The compaction of the roadbed disrupts groundwater flows and the impervious nature of the road surface increases runoff. Runoff and diverted waters are often concentrated



Caribou are one of the northern species potentially impacted by mines, particularly those involving the construction of new roads

Environmental Impacts

(Continued from page 6)

life into their claims," says Tlingit spokesperson Melvin Jack.

Environmentalists argue that the road will lead to logging, more mines, and the eventual destruction of the area.

The Alaskan government is "deeply concerned, fearing the mine will damage a lucrative salmon fishery," and has asked that the International Joint Commission, a body set up to deal with transboundary water disputes, conduct an independent review of the project.

17

Environmentalists battle Omineca mine road

(Vancouver Sun, 08/10/78)

The BC Wildlife Federation was fighting the extension of the mine road, which cut northward from Fort St. James into remote Wilderness areas. Federation spokesperson, Les Storey, said that the costs were "astronomical with regard to environmental damage." The impacts included destruction of fisheries, as well as disruption of caribou feeding and migration corridors.

18

Have the north's grizzlies met their match in mine road?

(Vancouver Sun, 05/19/98, A15)

There may be as many as 11,000 or as few as 3,000 grizzlies in BC, but there is presently a healthy population in northern BC near the Taku River.

Biologists are trying to determine what the impact of the 160-km Tulsequah Chief mining road will have on the bears.

Biologist Tony Hamilton believes that if the access road is restricted to industry use the bears have a chance; but if the road is open to other traffic bears will be shot. When no regulations exist to protect bears, experience has shown this to be true time and time again.

19

B.C. Natives vow they'll go to court to stop mining road

(Vancouver Sun 04/20/98, B5)

The Taku River Tlingit First Nation has concerns that the 160-km access road to the site will affect their traditional hunting and fishing grounds and open up their country to other resource users "at precisely the time we are attempting

(Continued on page 8)

Environmental Impacts

(Continued from page 7)

to negotiate our ownership and jurisdiction of this land at the treaty table."

The Tlingit say the environmental review did not satisfy their concerns about the impact of the road on their communities and on wildlife, especially moose and grizzly bears.

20

Proposal for B.C. mine may fuel Pacific fish fight (*Globe & Mail*, 14/07/98, A7)

The Alaska government has concerns that the Tulsequah Chief mine in northern BC could destroy salmon runs vital to downstream U.S. fisheries. The main concern is the impact of the mine's access road, which would carry ore to Atlin, 100 km north of the mine. It crosses streams 69 times, and could open an undisturbed wilderness area to logging and other developments (e.g., other mines). Mine activities, as well, could affect wildlife habitat and water quality, which in turn could impact the salmon runs.

21

Environmental Guidelines for Access Roads and Water Crossings (Ontario Ministry of Natural Resources)

22

Environmental Mining Council of BC. 1998. Acid Mine Drainage: Mining and water pollution issues in BC

This document, produced by the Environmental Mining Council of BC (EMCBC) discusses different sources and types of water pollution, with a focus on acid mine drainage (AMD). It also provides information on predicting AMD, and outlines a number of case studies on the various impacts and costs associated with this form of water pollution. This report can be obtained by contacting EMCBC (emcbc@miningwatch.org, ph: 250-384-2686).

23

Breaking up rock sets off production of toxic cocktail (*Vancouver Sun*, 02/12/88, B1)

It is estimated that there are 300 million tonnes of acid-generating wastes in BC. In 1988, at least 5 of the 16 operating metal mines had AMD control pro-

(Continued on page 9)

in culverts and channels, which, if improperly designed, can burst and cause flooding and erosion. All of these factors increase erosion and result in increased sedimentation and turbidity of the receiving waters.

Sedimentation can damage or destroy fish habitat; reduce the number of organisms and bury aquatic vegetation on which fish feed; clog and damage fish gills and make it difficult for fish to feed; and destroy spawning areas.

The Alaskan government is concerned that the Tulsequah Chief road will impact water quality, and harm the salmon fishery on the Taku River. The access road will cross streams 69 times.(20)

According to an Ontario Ministry of Natural Resources document:

"Any water crossing has the potential for significant detrimental impacts on water quality." (21)

Les Storey of the BC Wildlife Federation has noticed the effects of water crossings and culverts on streams and rivers that parallel the Omineca Mining Road in northern BC.

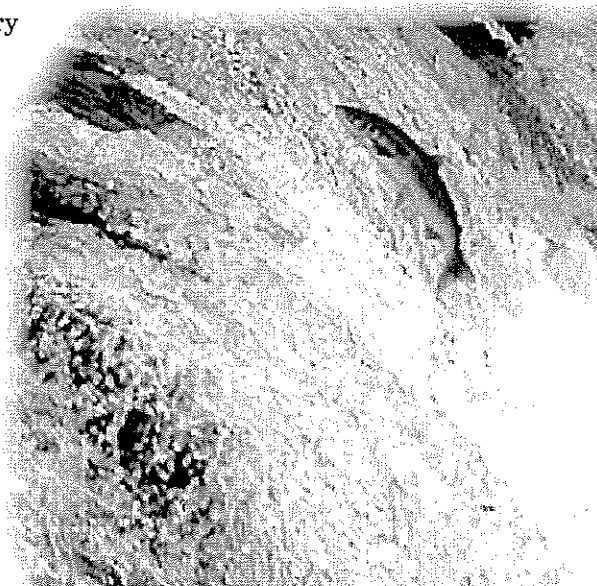
"Spawning grounds alongside 460 km of a gravel road lie empty partly due to siltation of spawning beds and also because salmon and steelhead have been unable to struggle through the road's plugged culverts." And on a newer section of the road, "there is not one river, stream, creek or rivulet that has not been damaged by road construction," said Storey.(17)

Chemical and fuel leaks and spills also occur on roads. These substances can run off of roads into watercourses where they can pro-

duce acute toxic impacts on aquatic life.

Water Quality

Water has been referred to as "mining's most common casu-



Fish like this spawning salmon are among the first casualties of acid mine drainage and tailings breaches

alty."(22) Mining consumes, diverts and can seriously pollute water resources. When water quality is compromised, both aquatic and human communities can suffer.

As mentioned above, roads can seriously impact water quality. However, pollution of water during the construction and operation of a mine can have much more serious implications. Water pollution from mine waste rock and tailings often need to be managed for decades, if not centuries, after closure.

There are several types of water pollution related to mining. The most serious threat to water quality is acid mine drainage. Tailings spills can also have severe impacts in both populated and remote regions. Fuel, chemical and sewage

Case study: Tailings leaks at Faro

The Faro lead-zinc mine in the Yukon has had a history of problems with its tailings pond.(28)

From 1969 to 1975 at least a half-dozen leaks in the tailings impoundment system were monitored. There were seepages of high pH effluent, contaminated with elevated levels of lead, zinc and arsenic, into Rose Creek. In addition to these leaks there were a number of major failures of the tailings pond resulting in large releases of effluent into Rose Creek.

In March of 1975, two dikes failed and 54 million gallons of contaminated tailings water flowed into Rose Creek, depositing tailings downstream for a distance of 15 km. Charges were laid by DIAND and the Environmental Protection Service. The company pleaded guilty to one of the charges and was fined the current maximum daily fine of \$5,000, but the fine was reduced to \$4,500 on appeal.

Another episode occurred over a several month period in mid-winter of 1976, when highly toxic levels of cyanide were released into Rose Creek. Fisheries officials considered that this spill resulted in "the waters of Rose and lower Anvil Creek being toxic to [fish downstream to] the Pelly River." Charges resulted in a fine of \$49,000.

In December, 1979, there was yet another breach of the tailings pond, resulting in a spill of 2.5-4 million gallons of effluent toxic to fish.

line leaks and spills, and erosion/ sedimentation are also detrimental to water quality.

Acid mine drainage

Acid is created when water and oxygen come in contact with sulphide-bearing minerals. The chemical reaction that takes place creates sulphuric acid, which in turn is able to dissolve minerals, releasing potentially harmful metals previously bound up in the rock. Acid may be generated under natural conditions prior to any disturbance for mining purposes. However, mining tends to exacerbate acid generation.



Acid mine drainage at Equity Silver Mine in BC

Throughout the entire mining process minerals are broken down, crushed, and ground up, exposing much more of the sulphide minerals

to air and water than would occur under natural conditions. Acid drainage occurring at mine sites is known as "acid mine drainage" or AMD for short.

According to Keith Ferguson of Environment Canada, "Acid mine drainage is perhaps the most serious environmental problem a mine can face. . . the problem is difficult to arrest, and the costs associated with long-term pollution abatement can turn a once-profitable mine into an expensive liability." (23)

Environmental Impacts

(Continued from page 8)

grams, and six abandoned mines were acid generating.

24

Tsolum: Concern for this damaged river grows (*Times Colonist*, 10/10/95, A5)

The Mt. Washington mine operated for less than 3 years before the company (Mt. Washington Copper) went into receivership. Exposed pyrite ores reacted with oxygen and water to form AMD, which leached copper from the ore. Copper leachate moved through the watershed, eventually reaching the Tsolum River. For more than 10 years the government has attempted to remedy the problem, spending in excess of \$1 million of taxpayers' money to date.

25

Mine's seepage poses threat to river (*Vancouver Sun*, 02/12/88, B1)

Only one year after Equity Silver Mine began operating, the waste rock dump was already generating AMD. Every second, about 30 litres of the toxic liquid seeps from the base of the waste rock dump.

At the time, there was no collection system for the AMD, even though Equity had been advised that there was a potential the waste rock would be acid generating. The company has since built a system of dams, pipes and pumps to collect and treat the AMD.

26

Royal Oak fined for Back Bay pollution (*Yellowknife*, 03/25/92, A3)

The discharge of 3000 gallons of tailings sludge containing arsenic cyanide, copper, lead, nickel and other chemicals occurred after an operator at the company attempted to pump the toxic sludge through a pipeline. The pipeline overflowed while the operator left his post to take a 30-minute lunch break.

27

Mining's dam problem (*Globe & Mail*, 05/16/98)

There have been 25 major failures of tailings dams since 1971, according to the World Information Service of Energy based in Amsterdam. Canadian companies have been responsible for three of the seven failures that have occurred since 1994.

"Tailings dams are supposed to last

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Environmental Impacts

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forever," said one exasperated mine consultant, "but they don't."

"Nobody wants to spend any money on tailings," says Eli Robinsky, a Toronto civil engineering consultant and critic of tailings dams. "They've taken all the goodies and now they throw all the junk in the back yard."

28

Weinstein, M. 1992. **Just Like People Get Lost: A retrospective Assessment of the Impacts of the Faro Mining Development on the Land Use of the Ross River Indian People** (Prepared for the Ross River Dena Council)

Using interviews, oral histories, community mapping and government documents, this report traces the environmental and social impacts of the Faro mine on the Ross River Dena people.

For information on how to obtain a copy of the report, contact Martin Weinstein (ph:250-339-4337; email: wstein@mars.ark.com).

29

Alaska mining company agrees to \$4.7 million environmental settlement (US Department of Justice press release, <http://www.usdoj.gov/opa/pr/1997/July97/294enr.htm>)

30

Creek damage investigated: dirt from mine construction running into water (Prince George Citizen, 08/27/97, p.3)

Dirt from the construction of Royal Oak's copper mine in northern BC was observed to be running into Kemess Creek, "muddying the water and blanketing the bottom of the creek with silt." It was a concern to environment officials because the creek is home to bull trout and Dolly Varden.

"It could have harmful impacts on fish spawning and kill off the insects the fish feed on," said BC Environment official Dave Sutherland.

There are ore bodies in Norway that were mined in the 1700s that are still acid generating. Ferguson was not aware of any identified acid mine that had stopped generating acid mine drainage on its own.(23)

Impacts from acid mine drainage

Acid mine drainage impacts water quality in a variety of ways. Acidity is harmful to many fish and aquatic organisms. Perhaps more importantly, many metals become mobile as pH drops (i.e., as water becomes more acidic), and at high enough concentrations these metals become toxic to most life forms.

For example, acid mine drainage at the Mt. Washington mine on Vancouver Island contributes to the leaching of copper, which is the "dreaded enemy" of young salmonids (coho, pink and chum salmon fry, and cutthroat and steelhead fry). According to Father Charles Brandt of the Steelhead Society, "It is a scientific fact that the amount of copper that finds its way yearly into the Tsolum watershed kills young salmon and deters adult salmon escaping back to the river to spawn."(24)

If the AMD was left untreated at the Equity Silver Mine in northern BC, "people would no longer be able to drink the water." So says Brian Wilkes, a chemical engineer with the BC Environment and Parks ministry. Copper levels in Buck Creek (the drinking water source for area residents) would be 750 times higher than the recommended level, and arsenic 20 times the recommended limit. The water treatment system required to neutralize AMD at the Equity mine site (now closed) costs the company more than \$1.2 million annually. According to Wilkes the flow of AMD at Equity could continue for up to 150,000 years, there-

fore, the treatment system essentially will have to continue to operate *in perpetuity*.(25)

Tailings: leaks, seepages and breaches

Tailings are the waste products of the milling process. During this process, the ore is crushed, ground into fine particles and mixed with water and chemicals to extract the target minerals. What is left – a liquid slurry containing the leftover rock particles, water and chemicals used in the processing – is usually piped to specially constructed containment areas, known as tailings ponds or impoundments. In these impoundments the wastes are held in by earthen dams or berms. In other cases, tailings are stored in previously excavated mine pits/shafts.

Tailings are transported from the mill to the tailings pond through pipes or ditches. Water can be contaminated when leaks develop in the pipes or when ditches overflow. This occurred at Royal Oak's Giant Mine in Yellowknife, in 1992. More than 3,000 gallons of tailings sludge containing arsenic (31-391 times the allowable limit), cyanide, copper, lead, nickel and other chemicals were accidentally discharged by the company. The contaminated slurry eventually overflowed the drainage ditch and migrated into Baker Creek and then Great Slave Lake, where people from Yellowknife both swim and fish.(26)

Other causes of water contamination include seepages through or around tailings dams, and breaches or failures of tailings dams themselves.

"Most of these things fall down when they are not built according to design," said Mike Campbell, executive director of the International

Council on Metals and Environment, an industry-based organization. However, even if designed properly (e.g., with adequate storage capacity and drainage), construction problems may lead to failures. Because dams are most often built of material available at the mine site, there can be considerable inconsistencies in quality.(27) Earthquakes, typhoons, heavy rainfall and spring melts also add to the risks of dam failure. And perhaps one of the greatest engineering challenges faced by companies wishing to develop mines in remote northern locales is designing tailings dams in permafrost soils.

Impacts of tailings accidents

In the past few years, there has been a number of international tailings disasters.(27) In many of these cases agricultural lands and other properties were contaminated, and in some cases, human deaths resulted. In regions where lands are not used for agricultural purposes, tailings spills can impact the environment in other ways, e.g., through the destruction of streams and fish habitat.

Chemicals: leaks and spills

A mine may use thousands of tonnes of chemicals every year to extract the target minerals from the ores, or to treat the contaminated tailings and processing waters. All of these chemicals have to be transported to the site, and then a series

of pipes and holding tanks are used to move and store the chemicals within a mineral processing facility. Thus, there are many chances for spills and leaks.

In 1981, there was a major sulphur dioxide spill (approximately 41,000 litres) at Equity Silver Mine in northern BC. The chemical found its way into Buck Creek, and as a result, residents living nearby were told to stop drinking the water from the creek.(25)

Other potential water contaminants include fuels, oil, and sewage.



Mining is the source of sometimes severe streambed erosion

The U.S. Department of Justice recently alleged that Cominco Alaska Inc. violated the federal Clean Water Act by exceeding the allowable limits for metals and pH at their Red Dog Mine and at the mine's Chuckchi Sea port. There were also allegations of unpermitted discharges of sewage from a temporary housing facility and more than a thousand violations at Cominco's sewage treatment system at the port. Cominco spent more than \$4.7 million to settle the lawsuit out of court.(29)

Environmental Impacts

Contact Organizations

Here are a few places to look for further information on mining impacts.

CANADIAN ARCTIC RESOURCES COMMITTEE (CARC)

This citizens' organization based in Yellowknife, NWT, conducts research and advocacy work on issues related mineral exploration and development in the Slave Geological Province between Yellowknife and the Arctic coast.

Website: <http://www.carc.org/index.html>

Phone: 867-759-4284

Email: info@carc.org

INNU NATION

The Innu of eastern Quebec and Labrador have opposed mineral exploration at Emish since 1995. The Voisey's Bay nickel mine at Emish is the latest threat to Innu land and Innu rights, intensifying the impacts of the low-level flight training, road expansion, industrial forestry and hydroelectric developments which have already had profound cultural and environmental consequences. The Innu website is filled with information pertaining to the Innu's struggles to negotiate a land rights settlement with the Newfoundland and federal government, in the midst of dealing with the vast social, environmental and economic implications of both the Voisey's Bay mine and the unprecedented level of mineral exploration throughout their territory.

Website: <http://www.innu.ca>

Phone: 709-497-8398

Email: innuenv@web.net

MINERAL POLICY CENTER (MPC)

This US-based organization is dedicated to preventing environmental impacts associated with irresponsible mining and mineral development, and to cleaning up pollution caused by past mining. MPC carries out mining-related research; publishes books and reports; lobbies for legislative and regulatory reform of mining laws; provides technical assistance for mining-affected communities; and sponsors community-based workshops on mining.

Website: <http://www.mineralpolicy.org>

Phone: 202-887-1872

Email: mpc-us@msn.com

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Environmental Impacts

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PROJECT UNDERGROUND

Project Underground works toward exposing corporate environmental and human rights abuses, and supports communities facing the mining and oil industries.

Website: <http://www.moles.org>

Phone: 510-705-8981

Email: project_underground@moles.org

UNITED STEELWORKERS OF AMERICA (USWA)—CANADA

The USWA had its origins in the steel and mining industries, and is now a diverse union representing approximately 200,000 Canadian workers. The USWA website has plenty of information on issues including: Steelworkers working for women; health, safety and environment; factsheets on mining for health & safety activists; labour campaigns; and links to other labour organizations. A second website (<http://www.schoolnet.ca/collections/uswa/>) offers highlights of the United Steelworkers of America Canadian Collective Agreements Database, which covers the following topics: Work Environment and Empowerment; Human Rights; Remuneration; Hours of Work; and Health and Safety.

Website: <http://www.uswa.ca/>

Phone: (416) 487-1571 (National Office, Toronto, ON)

Email: uswa@uswa.ca

YUKON CONSERVATION SOCIETY

This environmental group located in Whitehorse, YT, focuses on issues relevant to northern Canada. These include mining, forestry, wildlife, contaminants and energy, among other things.

Phone: 867-668-5678

Email: ycs@polarcom.com

Erosion and Sedimentation

Soil disturbance is greatest during the mine construction phase. The resulting vegetation disturbance, atmospheric dust and noise from construction equipment are also likely to be at their highest levels. Significant soil disturbance can lead to increased erosion, and if enough

water is flowing through the site large amounts of sediment can be transported to streams and lakes, creating high turbidity and blanketing creek bottoms.(30) As explained above, in the sub-section on road impacts, sedimentation can adversely affect aquatic organisms.

Conclusions

Mines generally close down because either the ore body has been exhausted, or prices for the mineral make it uneconomical to continue with the mining operation.

Unfortunately, even though mines close down, impacts do not necessarily cease. Acid mine drainage can be a long-term problem, persisting for centuries or even millennia. Underground mines can collapse years after closure, contaminated tailings impoundments can continue to be a threat to fish and wildlife, and land can take years to recover from atmo-

spheric deposition of smelter emissions.



Impacts can last long after the ore is gone.

This potential for perennial impacts underscores the need for comprehensive planning and community-level decision making in advance of mine development.

Community Impacts

Mining developments have the potential to completely transform economic, social and cultural aspects of life in nearby communities.

As with any major development in remote or populated areas, the balance between positive and negative impacts needs to be carefully assessed in light of past performance and future promises of the company (and industry) involved. The gap between promise and performance has often weighed against the interests of community sustainability. Some of the factors governing impacts are outlined below.

The Economics of Boom and Bust

The most obvious positive impact of a mining development is the potential economic benefit derived by nearby communities. Mines can contribute to a community's economy by providing employment to community members, and by pumping money into the local economy through the purchase of goods and services.

Unfortunately, economic benefits related to mining are often short-term. Diamonds may be forever, but diamonds mines are not. Minerals are non-renewable resources: when an ore body is depleted, the mine shuts down. Mines will never be a permanent answer to a community's economic woes.

Furthermore, the reality of the industry is that global prices are the major determinant of whether or not mines continue operating. Mines often shut down temporarily due to low metal prices, and workers, in the meantime, are laid off.(31) Thus, mining operations do not necessarily provide long-term economic stability for either individual workers or the community at large.

Employment

While it is true that employment

opportunities are created when mining projects are developed, there are issues regarding who will get the jobs (local vs. outside workers), how long the jobs will last, and whether or not the people of the community even want to work at a mine.

Many mining jobs require highly skilled or specially trained employees, and if members of nearby communities do not have the required skills the workforce must come from outside the region.

Promises of jobs and training programs are often offered by mining companies and governments as part of an agreement with communities who risk being impacted by a proposed mine.(33,34) Unfortunately, the promise of jobs does not always translate into long-term employment.

Lessons can be learned from the oil and gas industry. When oil and gas exploration boomed in the 1970s and 1980s many companies pursued Native employment and business creation. But relatively few Native people gained permanent or significant work and, in any case, job creation was fairly localized. Now that the oil boom is over, those jobs no

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Articles with underlined titles are available in photocopy form from the Environmental Mining Council of BC.

31

Curragh lays off 177, may close Faro mine

(Financial Post, 02/23/93)

The Faro mine is the Yukon's largest private-sector employee. The layoffs are temporary pending a \$29-million government loan guarantee to develop the new Grum ore body. Curragh has been squeezed by a global glut of zinc concentrates that has weakened demand and sparked cutbacks from other major producers.

32

Death and rebirth of a town (Up Here, Nov/Dec 1996, v.12(6), pp. 16-18)

This article by freelance

writer Brenda Barnes follows the boom-bust cycle of the mining town of Faro in the Yukon. The town, created to house and provide services for the workers of the mine, has had its population fluctuate between 2,100 and 90 residents over its 30-year history. The article includes interviews with some die-hard Faro residents, who are intent on staying in the community. These folks are working on devising community economic strategies to keep Faro alive during temporary shutdowns and after the inevitable closure of the mine.

33

Company pledges jobs for Natives (Globe & Mail, 10/21/96, A1,A8)

BHP recently signed an agreement with the government of the Northwest Territories committing the company to hiring up to 2/3 of its diamond mine work force from northern and aboriginal communities (at least half must be Native). As well, the company must report regularly to the government on meeting its commitments (on hiring, training and business opportunities). BHP has also agreed to pay airfare for shift workers from communities as far away as the Arctic coast. In return, the territorial government will provide accelerated apprenticeship programs to help tradespeople take advantage of the project.

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Falconbridge signs historic deal with Inuit

(*Montreal Gazette*, 03/01/95, B4)

Falconbridge's Raglan nickel mine will change the landscape of an area of northern Quebec forever with the construction of 10 open-pit and underground mines, new roads, port and airport facilities and residences.

According to the company's environmental impact statement, the project's impacts include high-acid mine tailings, gas and smoke emissions, increased airborne dust, use of ice-breakers and large tankers for transport and the disposal of effluent from sewage and mine operations. Consequently, marine plankton, fish, caribou, fox and seal populations will be affected.

In exchange for the rights to develop and operate the project, Falconbridge will pay \$75 million in compensation to the Inuit.

The Inuit will get at least 150 of the 800 jobs, and they will have a large role in evaluation of the project's environmental impact.

35

Neither boom nor bust: the renewable resource economy may be the best long-term hope for northern communities

(*Alternatives*, v.22(4), Oct/Nov. 1996, p. 18)

In this article, the author, Heather Myers, assistant professor in International Studies at the University of Northern BC, argues that non-renewable resource industries have not ensured adequate or stable employment, either for northern peoples or for imported workers. Furthermore, the younger generation has not shown a clear preference for moving from the land into industry. Northern Native people do not necessarily want to mimic the southern industrial or "nine-to-five" model.

In the pursuit of appropriate northern development, renewable resources can offer the potential for income, while complementing community lifestyles and values. They can be locally based, small-scale, flexible, renewable and true to indigenous tradition. While they will not provide a total answer to northern development, employment or income needs, renewable resource-based ventures will satisfy some key needs and values.

Case study: Faro's Economic Rollercoaster

In 1969, Cyprus-Anvil Mining Corporation built the town of Faro to accommodate workers for their lead-zinc mine, the second largest in North America.

The 1970s and early 1980s were the boom years in Faro, when the town's population peaked at over 2,100 and additional camp facilities were built to house the more than 700 mine workers.

In 1982, though, prices of lead and zinc fell sharply, and by June of that year, production at the mine had come to a grinding halt. A planned three-week shutdown became eight weeks and then 17. In September, the mine announced it would not be resuming operations that winter. The announcement caused a mass exodus of employees and their families, and Faro's population dropped to less than 900.

In 1984, Cyprus-Anvil announced it was mothballing the mine. As a result, the population plunged to 90, and Faro became a ghost town.

In 1985, a new buyer (Curragh Resources) surfaced and Faro's population boomed once again. The mine operated until 1993, when lead-zinc prices plummeted, forcing Curragh to close the mine and seek protection from its creditors.

In November 1994, another company, Anvil Range bought the mine.

In February 1998, Anvil Range, like Curragh, sought protection from its creditors and the mine went into receivership.

Unless a new buyer is willing to assume the environmental liability associated with the huge tailings pond and numerous acid-generating waste rock piles, the mine site will remain dormant. And with the mainstay of the town's economy lost, the people of Faro must find other means of generating income or else Faro will once again be nothing but a ghost town. (32)

longer exist.(35)

Another issue related to employment is that even if jobs are available, the work might not be agreeable to members of the community.

At the Faro mine in the Yukon, "jobs at the mine were tried and quickly abandoned by most [aboriginal] people as unattractive for many reasons, including scheduling, discrimination, and working conditions. Other types of employment, particularly seasonal and part-time work, were in demand."(28)

The Faro experience is not an isolated case. Susan Wismer writes that while exploration work can be compatible with subsistence activities of aboriginal people in the northern regions of Canada, experience with jobs in the mines themselves has been less favourable. "The nature of the work, its scheduling into

shifts that are often at least two weeks in length, the distance of mine sites from home communities, and the need for a consistent and reliable workforce that does not take time off on a seasonal basis, creates a situation in which the benefits of employment in the mines are often offset by the costs of social and family disruption and loss of opportunities to participate adequately in community life."(37)

Costs and Benefits

One question that a lot of communities facing mining developments are asking is who really serves to benefit from this development, and who pays the costs?

Environmental impacts often translate into economic impacts, as resources previously used as a source of formal income or subsis-

tence purposes are rendered unusable.

In 1966, the Mt. Washington Mine on Vancouver Island went into receivership after only two years of operation. Yet it left a legacy of acid mine drainage and heavy metal pollution that continues to flow untreated into the Tsolum River. The concentration of copper, particularly harmful to young salmon, has all but wiped out the once healthy salmon runs. It has been estimated that the loss of the salmon fishery costs nearby communities \$2 million a year. To date, the province has already invested \$1 million in its attempts to deal with the problem. The most probable means of controlling the AMD will cost taxpayers at least an additional \$6 million.(24)

At Equity Silver mine in northern BC there is presently a system in place that treats the acid mine drainage that continues to flow from the mine. If the treatment system were to fail for an extended period of

time, the AMD would cause the poisoning and eventual loss of all fish as far 215 km downstream. The resultant potential loss of economic benefits and employment from commercial and sports fisheries is estimated to be in the range of \$4.3 million per year.(25,38)

There are health impacts, which are next to impossible to attach a value to, that also result from mining operations.

As Lloyd Tataryn writes, "the Indians in the NWT have not been the primary beneficiaries of the arsenic-contaminating industries located in Yellowknife. We feel it is unjust that companies can make profits from jeopardizing the health of the people who have lived on the land since time immemorial."(39)

Community health impacts related to mining are addressed in more detail in the next section of this kit: Health and Safety.

Case Study: Need for Targetted Training

In 1995, Falconbridge signed an "historic" agreement with the Inuit in northern Quebec. Among other things, the company agreed to provide at least 150 jobs and training for the Inuit people at their Raglan nickel mine.(34)

The company originally thought that within 10 years Inuit could comprise 90% of the workforce. However, three years after the agreement was signed, and after spending \$4 million on training, less than 25% of the workers are Inuit, (36) and the percentage of Inuit employees at Raglan is not likely to rise in the next couple of years.

To date, the training has concentrated on preparing workers for jobs as cooks, heavy equipment operators, mechanics and truck drivers. With the construction phase over and production gearing up, there will not be many more jobs available to the Inuit until they train and qualify for jobs in the mill or underground.

"We should . . . make greater efforts to ensure that we target the occupations with the greatest potential for employment," said Jim Delaruiet, Kativik School Board's director of vocational and adult education.

And that's what the Raglan Technical Committee on employment and training has decided to do. At the heart of their new strategy is a college-level program in mining, as well as on-the-job training at the mine.(36)

Even with targetted programs in place, it remains to be seen whether training dollars will translate into stable, long-term employment for the Inuit people.

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Training of Inuit stepped up at Raglan mine (*Nunatsiaq News*, 04/23/98; http://www.nunatsiaq.com/nunavik/nun80424_18.html)

Initial training concentrated on preparing workers for jobs as cooks, heavy equipment operators, mechanics and truck drivers. Now that that construction phase is over and production is gearing up, the mine needs workers to excavate and process the nickel ore; these are specialized trades that require additional training.

Turnover last year at Raglan reached 70 percent.

37

The Nasty Game: how environmental assessment is failing aboriginal communities in Canada's north (*Alternatives*, 22(4), Oct/Nov, 1996. p. 12)

This article is written by Susan Wismer, assistant professor in the Department of Environment and Resource Studies at the University of Waterloo. In the article, Wismer writes that Environmental Assessment (EA) can and should be an excellent process for determining whether or not the outcomes of economic development are likely to be positive or negative for communities. But the EA process for the BHP diamond mine failed to address if, when and how mining could contribute to community sustainability.

38

B. Wilkes. BC Ministry of Environment, Lands and Parks. **Consequences of unregulated release of raw acid mine drainage into the Bulkley River, British Columbia** (Presented at the 11th Annual Mine Reclamation Symposium, Campbell River, BC. April 8-10th, 1987)

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39

Notes from the Territories: arsenic poisoning (*Alternatives*, v.7(2), 1978, p. 12)

This article was written by Lloyd Tataryn, a journalist and environmental consultant to the National Indian Brotherhood. The article describes a number of studies on the impacts of arsenic poisoning. Tataryn then relates how the federal government released the results of a study that found many health defects among Yellowknife citizens commonly associated with arsenic poisoning, but the government failed to do an adequate follow-up study. Consequently, the aboriginal people in Yellowknife took it upon themselves to conduct a study of hair-arsenic levels in their children and mine workers compared to levels in children and mine workers living in Whitehorse, Yukon. The results showed that arsenic levels from the people in Yellowknife were above the "acceptable level," while levels of the citizens of Whitehorse were negligible.

40

52% of the population deserves a closer look: a proposal for guidelines regarding the environmental and socio-economic impacts on women from the mining development at Voisey's Bay.

Produced by the Tongamiut Inuit Annait Ad Hoc Committee on Aboriginal Women and Mining in Labrador, this information comes from the Innu Nation's website (located at <http://www.innu.ca/womenguidelines.html>).

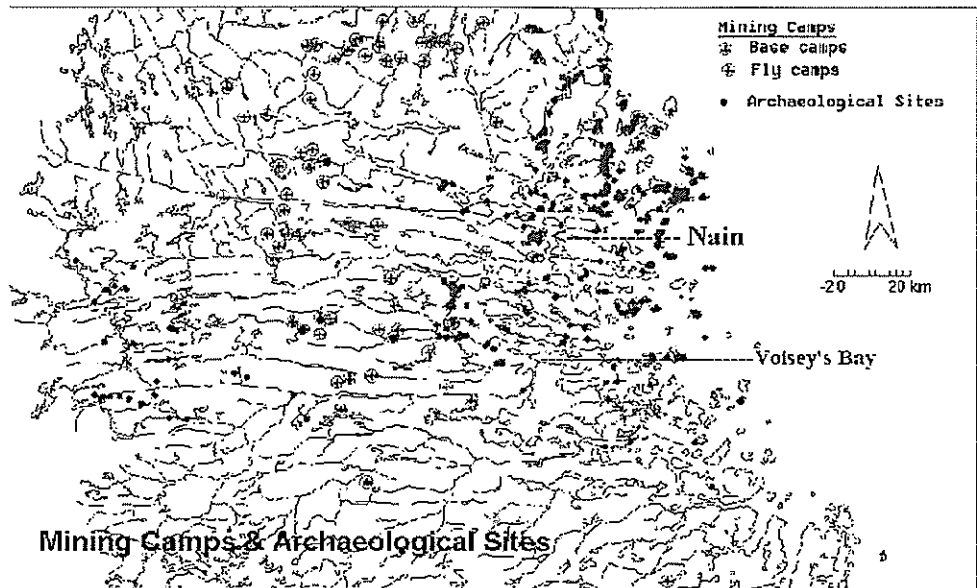
41

Miners sent to remote sites to work suffer from stress (*Financial Post*, 09/13/88, p. 5)

Fly-in mining, where workers are transported into remote mine sites for specific lengths of time, is the alternative to the historical pattern of establishing mining towns. The typical patterns are working for 7-14 days and spending the same amount of time at home; or working 3 months or more and taking 3-4 weeks off.

Mark Shrimpton, adjunct associate professor of geography at Memorial University in St. John's, Nfld, recently completed a report on fly-in mining. Shrimpton found that added stress experienced by fly-in miners could result in

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Produced by the Innu Nation, this map shows the potential for mining exploration to impact archaeological sites (5)

Social and Cultural Impacts

The social and cultural implications of mining developments are often brushed under the rug in order to focus on "what is good for the economy." However, the social impacts of mining developments have to be addressed in order to create or sustain healthy communities. Some potential social impacts related to mining are listed below.

Community Services

Many projects will result in an influx of workers, almost entirely male, into communities. A large, transient population can put a strain on the existing recreational, health, social and business services.

If services and infrastructure, such as more powerlines, sewage and housing, are developed to meet the needs of a larger population, and then at the end of the mine's life the transient workers leave the community, the people left behind will end up shouldering the tax burden to pay for the infrastructure improvements.

Housing

The influx of workers can also result in housing shortages, inflated house prices and rents, and low vacancy rates. These factors make it difficult for single-parent (women-headed) households, women who are trying to leave abusive homes, low-income, unemployed and underemployed people to find houses to buy or rent.

Women's Issues

The Tongamiut Inuit Annait Ad Hoc Committee on Aboriginal Women and Mining in Labrador has outlined a number of concerns related to potential impacts that mining developments may have on women.(40) Their concerns include possible disruption of marriage and family life, increased responsibilities for women in the home, violence against women, sexual harassment in the workplace, and lack of job opportunities.

A professor at Memorial Univer-

sity in Newfoundland has found that for married workers, long absences from home can contribute to marriage breakdowns and disrupt family life.(41)

If male partners are employed at mines that require them to be away from home for weeks or months at a time, the primary responsibility for managing the household (provision and preparation of food, subsistence harvesting, care of clothing, housework, maintenance of household accounts, childcare) will fall to women. This can potentially affect women's participation in community life.

Miriam Wall, writing on the impact of resource developments on women in northern Ontario states,

"Time is a premium for many women. As mothers they often cannot afford to be away over night or for long periods of time... working women, who find themselves overburdened with both their paid employment and traditional family role [can be] effectively excluded from further involvement in community."(43)

Wall also writes that job opportunities may be limited for women in single-industry towns. The traditional employment options available to women tend to be in the low-paying, service sector. Moreover, there is a certain "mill mentality" that exists in single-industry towns, and sentiments such as "you have to be a real man to be able to work in

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increased accidents on the job.

The report recommends shorter work rotations, greater choice of rotations, a more homelike environment, better telephone communications, and employee and family assistance programs to help alleviate stress. Prospective workers should also be informed of the nature of the living/working environment before they decide to work in remote areas.

42

Land claims threaten NWT diamond mine

(Financial Post, 02/15/96, p.1)

Two Dene Native bands have land claims negotiations with Ottawa on a 3,500 km² tract of land at Lac de Gras in the central Arctic, where BHP's Ekati

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Case Study: Ross River, Yukon Territory

The following case study is composed of information from the report "Just Like People Get Lost: A retrospective assessment of the impacts of the Faro Mining Development on the land use of the Ross River Indian People."(28) In the report, the author makes it clear that while there were impacts directly attributable to the mining development, there were concurrent factors, such as changes in education, transportation, employment, and social welfare programs, that contributed to the severe social problems experienced by the aboriginal community of Ross River.

Beginning in 1966, there was an influx of outsiders and businesses to Ross River to service the construction and operation of the Faro mine. In the ensuing years the Ross River band experienced increased "drinking, open conflicts, violence, sexual exploitation . . . the disintegration of some marriages."

The internal problems among the aboriginal people were exacerbated by the arrival of large numbers of transient white male labourers during the construction period. Many of the mine construction workers carried the stereotypic images of "Indians as victims and powerless," which were prevalent in Yukon and many other areas of Canada at that time. Women were seen as sexual objects and the men, when drunk, were seen as objects for abuse and violence. Raids by construction workers to abduct women from the village were not uncommon. There have been vivid descriptions of sexual exploitation and beatings of Natives by whites at the local bar.

Many of the southerners who settled in the village brought urban ideas, values and behaviour. The parents of non-Native children demanded a southern school curriculum and were instrumental in getting the school principal, who was sympathetic to the differing needs of the Indian children, dismissed. Thus, even aboriginal children were involved in the disempowerment.

The impact of roads, the stresses of village life, the dislocation of some family groups from their traditional lands, and the rapid transformation into a marginal minority changed the lives of the Ross River people forever. When these changes combined with the ready availability of alcohol, however, they produced a deadly combination. Public facilities for the purchase of alcohol became available in the region with the influx of mine construction workers. As all of the stresses to life in Ross River developed, extended periods of binge drinking became the rule. When people returned from a job with cash, alcohol would be bought and shared with friends and relatives until the money was spent.

Deaths from a variety of alcohol related causes, mostly accidents, began to occur in 1966. From that time to the present, death from alcohol-related causes has been a regular event for the Indian population, with one or more deaths from drinking almost every year between 1970 and 1989.

The community of Ross River is in the process of healing from the negative social effects that have so drastically changed their way of life in the past 30 years. In light of the recent and indefinite closure of the Faro mine, the people of Ross River must now try to develop strategies for building a more healthy, sustainable community.

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diamond mine would be situated. A lawyer who was closely following the issue of the competing claims said that an injunction to halt the project could be filed if business and government failed to secure a revenue-sharing agreement or make concessions to the Native bands.

43

M. Wall. Women and development in north-western Ontario
(*Alternatives*, v.14(1), Feb. 1987)

In this article, writer Miriam Wall addresses the issue of the roles of women in communities based upon extractive resource industries (such as logging and mining). Wall examines barriers to women's participation in the political and economic life of these towns, and suggests ways to increase the inclusion of women in decision-making positions within the communities.

the mill or mine" are not uncommon. This attitude can act as a real force in preventing women from even considering applying for what are often the only well-paying jobs available in the community.(43)

The need for gender-specific research has been acknowledged in recent federal environmental assessment processes. However, the last federal assessment process that women in Labrador participated in failed to adequately assess the impact of military flight training on women in the region. According to women's groups, the environmental impact statement either omitted or failed to directly acknowledge women's issues. For example, "sexual assault" was portrayed as "family or community violence," sexually transmitted diseases" became "communicable diseases" and "women's groups" became "concerned groups." (40)

Land Claims

There are six proposed mining developments valued at more than

\$30 billion in the Arctic, all of which infringe on unsettled Native land claims. Also, in addition to the Innu Nation, the Labrador Inuit Association has outstanding land claims affected by the nickel find at Voisey's Bay.(42)

Unsettled land claims can be a source of concern for aboriginal communities faced with a proposed mineral development.

In the Northwest Territories, the federal government has awarded mineral exploration rights to land over which the Dene assert aboriginal rights and title. "Without self-government agreements, the Dene are not entitled to any revenues from mining activities, even if the mine is literally in their backyard," says Marina Devine, chair of the Canadian Arctic Resources Committee.(42)

The Taku River Tlingit First Nation is presently deep into land-claim negotiations. However, some band members are concerned that a road being built by Redfern Resources to service the Tulsequah Chief mine will soon attract more mines to the

Case Study: The Dene Nation

During the course of the Norman Wells Pipeline and Oilfield Expansion Project in the NWT, people of the Dene Nation feared the bulk of benefits would flow to the south with the oil, and that northerners would be left to deal with the negative impacts.

The Dene repeatedly stressed that job skills training alone would not guarantee meaningful Native involvement in development. They called for training that would enable them to enhance their traditional renewable economy and protect their cultural and social life, to ensure that once the project was over they would still have families and viable communities to live in.

Despite problems with government funding, a Community Development Programme was eventu-

ally set up. This allowed the Dene to develop special projects on issues such as alcohol

and drug abuse, housing, economic development, community learning and decision making, Elders and youth, and health and education. Training was also undertaken in areas of monitoring techniques, leadership, communications and other types of professional development.

The programme was discontinued after only two years due to lack of federal funding. What the programme taught the Dene was that the regimes of an industrialized economy are foreign to them, and do not reflect their values and traditions. The realized that their cultural heritage is the only key to healthy social development and that this process must be in place if the Dene are to design and benefit properly from economic and political develop-

area. More mines mean a greater potential for impacts on traditional Tlingit lands. Tlingit spokesperson Melvin Jack is concerned that, "Industry seems to be going in under

the wire before our claims are settled. I feel, to some degree, that it is interfering with aboriginal rights."(16)

Community Impacts

44

Dene community development: lessons from the Norman Wells Project

(*Alternatives*, v.14(1), Feb. 1987, pp. 10-12)

Author Margaret Gorman relates the process that Dene communities went through to try to gain control over their society and economy in wake of the Norman Wells Pipeline and Oilfields Expansion project. The challenge for the Dene was to convert the opportunities brought by a non-renewable resource development into long-term benefits. When the Pipeline and Oilfields Expansion project was approved, the federal government committed \$20 million for programmes to ensure jobs, training and business opportunities for northerners. The government also imposed a two-year project delay to allow time for these projects to be put in place.

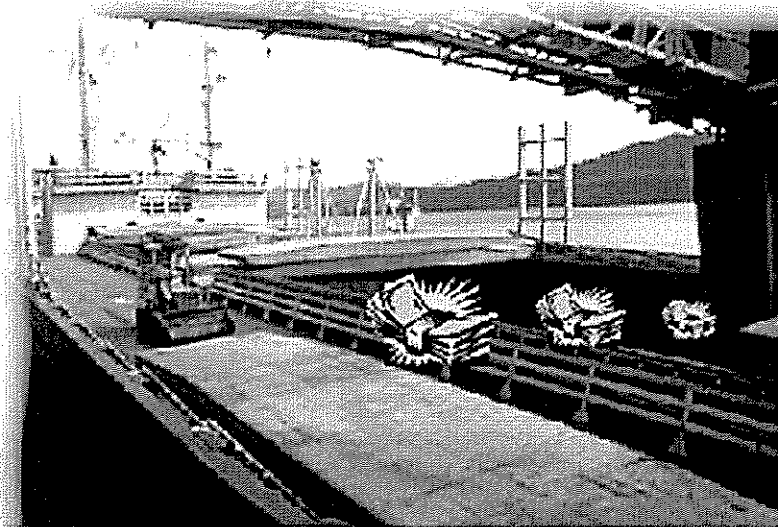
Addressing Community Impacts

Often there is not enough lead time given to communities to put programmes in place to deal with the negative social ramifications of mining developments.

Like the Dene (*see accompanying Case Study*), the Innu Nation of northern Labrador has expressed a great deal of uncertainty over the future of their communities and their way of life.(5) The Innu are worried about the implications of additional social and economic pressures wrought by mining developments on communities that

inability to change existing processes or to have any meaningful input into decisions related to the project.(44)

The Innu have had a similar experience, and are frustrated by refusals on the part of the companies involved – from Archean to Inco – to deal fairly with their concerns. The



Too often, the benefits of a mine are shipped out of a community along with the ore

are just beginning to heal after years of abuse and despair. The frantic pace of exploration and development has not provided Innu communities with enough time to adapt organically to this new reality.

The majority of problems experienced by the Dene with the Norman Wells Project stemmed from their

Innu have stated that the timelines and goals of the companies and the Newfoundland government do not take into account the need of the Innu to determine their own visions of an economic future for their communities—a vision that may not include the development of Voisey's Bay.

Health and Safety

Articles with underlined titles are available in photocopy form from the Environmental Mining Council of British Columbia.

45

Panel makes connection between hardrock mining and cancer

(*Canadian Occupational Safety*, v.32(4), 1994, p. 8)

This article mentions how one or two studies linking hardrock mining and lung cancer might have failed to convince panel members of the relationship; but it was hard to argue with 22 studies.

The studies found that: 1) the longer the exposure the greater the incidence of lung cancer, so it is older workers who are most often victims from their lifetime work experience in mining; 2) miners who had a mixed-ore experience had higher rates of cancer; and 3) rates of lung cancer among non-smoking uranium miners were similar to the rates of smokers in the general population. But rates increased significantly when mining was combined with smoking.

46

Study evaluates cancer risks for nickel miners (*Northern Miner*, v.81(46), 01/14/96, p. 5)

A McMaster University study has shown that certain workers in Ontario's nickel mines and mills are more likely to contract various respiratory-tract cancer than the rest of the population. The study examined health records for 66,100 workers employed by Inco and Falconbridge since 1940.

The United Steelworkers of Canada union has stated that oil mist and diesel fumes are to blame for the high incidence of cancer, and not the rock dust known to cause silicosis in the past. The union has called for a reduction in the level of harmful emissions emanating from the products of equipment manufacturers, and has urged Inco and Falconbridge to switch to electrical equipment from diesel.

47

Mystery ailments fell Fording coal miners (*Vancouver Sun*, 05/18/95, B5)

BC government officials and Fording management were unable to explain the cause of the array of ailments occurring

(Continued on page 21)

Health and Safety

"The mining industry has long had an unenviable history of industrial accidents and disease." (41)

When an underground explosion ripped through Westray Mine in Nova Scotia on May 9, 1992, killing the entire shift of 26 men, it was a devastating reminder to Canadians that the human toll taken by mining is not limited to the industry's bloody past.

Behind the tragedy of underground accidents is a range of less visible health and safety issues, such as the gradual buildup of carcinogens (cancer-causing agents), and air and water contamination. The impacts felt by miners and mine communities are indicative of an industry that has taken some important steps forward, but in many ways has yet to face the challenge of putting health and safety first.

Health Impacts: the Silent Toll

Down in the Mine

A range of health problems can be attributed to working in a mine environment.

Cancer

Cancer is serious health risk for

the men and women who work in mines. In the late 1980s, the Canadian Industrial Disease Standards Panel concluded that hardrock miners are more likely to get lung cancer than the rest of the population.(45) They based their conclusions on 22 studies conducted world-wide, all of

Diesel Exhaust

Exposure to exhaust from diesel combustion is one of the major health risks underground. This summary is from the United Steelworkers website: <http://www.uswa.ca>

Some Toxic Gases and Solid Particles in Diesel Exhaust	Health Effects
Carbon monoxide	Interferes with oxygen supply to body Contributes to heart disease
Nitrogen oxides or NOx	Irritates the eyes and respiratory system Decreases lung function May decrease resistance to infection
Sulphur oxides	Irritates the eyes and respiratory system
Hydrocarbons (including benzene, formaldehyde, phenol, butadiene, etc.)	Cause a large variety of health effects, including irritation, asthma and cancer
Polynuclear aromatic hydrocarbons (PAHs)	Cause cell mutations and cancer
Diesel Particulate Matter (DPM) or soot	Contributes to heart and respiratory Causes cancer

which found that the incidence of lung cancer in hardrock mining was above the norm.

The probability of developing cancer increases the longer a person works at a mine, if a person has worked in more than one mine (i.e., where different ores are mined), and if the worker smokes.(45,46)

These findings have ramifications for the people who work in the industry. Many workers will find themselves working at a number of different mines over their lifetime, since many mines are only in operation for a few years. As a result, these workers will be exposed to many different potential carcinogens.

Known carcinogens encountered at a mine site include: radiation, arsenic, nickel, sulphuric acid mist in the milling process, and asbestos. There are also suspected carcinogens such as oil mist and diesel fumes from mining equipment.(46)

In addition to cancer, there are other potential health problems that can result from working in a mine. In 1995, as many as 70 employees at an open pit coal mine in British Columbia were struck with a variety of ailments including blistered eyes, peeling facial skin, and longer-term respiratory and urinary tract problems.(47)

Health and Safety

(Continued from page 20)

at the coal mine. United Steelworkers of America representative, Don Takala, urged the company to shut down the mine until the cause of the health problems could be determined. The company did not agree that the situation was necessarily linked to mine operations, saying that they had examined the illness reports and "found no commonalities, with the exception of two or three."

48

Canada's uranium mining sparks desperate protest (Toronto Star, 02/27/88, M4)

The first coordinated act of civil disobedience against uranium mining oc-

(Continued on page 22)

Case Study: Arsenic Poisoning

In the 1970s, elevated levels of arsenic in snow, soil, water and vegetation samples within city limits confirmed that not only mineworkers but also the residents of Yellowknife were being exposed to the potentially lethal chemical. Exposure resulted primarily from the smelter emissions from Giant Yellowknife Gold Mines Limited. In May of 1975, Health and Welfare Canada released a study showing that many health defects among Yellowknife citizens were commonly associated with arsenic exposure. At the time, Statistics Canada figures also indicated that Yellowknife had a higher cancer rate than Canada as a whole.

Spurred by these findings, the National Indian Brotherhood and the United Steel Workers of America collected hair samples from aboriginal children living near Yellowknife, and from all the men working in the Giant Mine's mill. These samples were analysed and compared to samples of hair collected from children and mine workers in Whitehorse (which has no arsenic source). None of the children or mine workers from Whitehorse had hair arsenic levels above one part per million (ppm), whereas more than 90% of aboriginal children from Yellowknife and all of the mill workers from the Giant Mine had arsenic levels above one ppm. One ppm is the upper "acceptable" limit for hair arsenic – above this, toxicity soon develops.

Understandably, the aboriginal community was upset with these results. At the time, Lloyd Tataryn, consultant on environmental issues to the National Indian Brotherhood commented that, "The Indians in the Northwest Territories have not been the primary beneficiaries of the arsenic-

contaminating industries located in Yellowknife. We feel it is unjust that companies can make profits

from jeopardizing the health of the people who have lived on the land since time immemorial. We therefore cannot be content until the arsenic levels in the Indians of Yellowknife are no higher than those in the Indians in Whitehorse. The only way this can be accomplished is by forcing the companies to stop their polluting activities."(39)

More than twenty years have passed since the Health and Welfare Canada study, yet the arsenic poisoning continues. (49)

In 1996, a forum on arsenic was held in Yellowknife. During the forum, Dr. Andre Corriveau, chief medical officer for the NWT said exposure to large amounts of airborne arsenic can be dangerous, deteriorating the lungs and causing problems for people, particularly those with respiratory problems.

However, there are no regulations in the NWT to control the release of arsenic into the air. Royal Oak, the company that owns the Giant mine, releases between 10 tonnes and 11 tonnes of arsenic into the atmosphere each year on average.

According to Kevin O'Reilly, an environmental activist, "the technology exists to eliminate the air emissions . . . we should be aiming for zero discharge."

The "way" to limit pollution is known, all that is required is the "will" to clean up the operation. This dangerous pollution will continue until the company voluntarily introduces controls, or the government enacts legislation requiring companies to curb their emissions.

Health and Safety

(Continued from page 21)

curred in 1985 in Saskatchewan. The small Native community of Wollaston Lake led the protest. For 80 hours they blockaded all traffic in and out of two uranium mines. The blockade was "a final, desperate attempt to be heard." The Dene "saw no other way to voice their anger and frustration against an industry they claimed was ruining their community, their health, their means of livelihood and their children's futures."

49

Zero arsenic discharge possible (*Yellowknifer*, 05/24/96, A15)

A taskforce was set up in 1995 to deal with the arsenic emissions from Royal Oak's Giant Mine, to help the company control its emissions. The article points out that Environment Canada's main legislation to deal with arsenic is the *Canadian Environmental Protection Act*, but even armed with that there's little Ottawa can do to make Giant bring down emissions.

50

Years of working dangerously: at least 33 have died in Canada's mines since Westray (*Halifax Chronicle Herald*, 05/05/97, A1, A4)

This article provides a list of mining-related deaths, and their causes, for the years 1992 to 1996.

51

Mining still this country's most dangerous job (*Halifax Chronicle Herald*, 05/05/97, A2)

Statistics Canada rates mining and quarrying as the most dangerous occupations. Between 1988 and 1993, 5% of all workers killed on the job or by work-related illnesses (268 deaths) in Canada were miners/quarry workers. Rates of workplace injury and death are increasing in the mining industry, while they are decreasing in other occupations.

52

Curragh Inc. fined \$20,000 for safety offences (*Globe & Mail*, 12/05/92, B12)

Curragh Inc. was fined \$20,000 for two safety offences at its lead-zinc mine in Faro, Yukon. They were fined

(Continued on page 23)

Mental Health

In addition to physical ailments related to mining, there are also issues of mental health. A report written in 1988 documents the impact of fly-in mining (i.e., where workers are flown into remote areas to work and live for specific lengths of time) on a miner's physical and mental health.(43) The author concluded that the separation from family and friends and the inability to get away

from the work site combine to create stress that can be hazardous to a miner's mental and physical health.

Beyond the Mine Gate: Community Health Impacts

Mining operations can potentially impact the health of nearby community members in a number of ways. Noise pollution can be disruptive, chemical spills can taint water and food supplies (26), and air emissions can pollute water, soil and vegeta-

tion.

Uranium

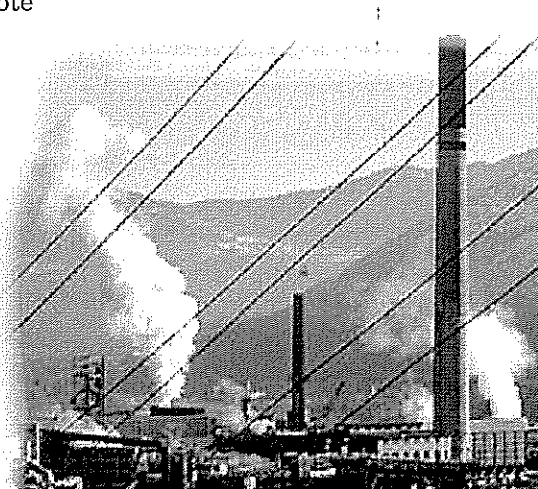
Uranium has been coined "death rock" by the Dene, and the land

around uranium mines has been termed the "sacrifice area," which expresses the idea that the impacted zone remains unsuitable for human habitation for thousands of years. The costs to Native communities living in the vicinity of uranium mines have been high: the animals they

depend on for survival have been adversely affected, as has their drinking water, and residents have reported new and unusual health problems.(48)

Smelters

Risks to health increase when smelters are part of the mining development. Residents of Anaconda Montana, where arsenic is emitted from a copper smelter, have a higher incidence of death from lung cancer than the general US population.(39)



Smelter emissions can be a major source of contamination

Safety: Mining Still a Dangerous Occupation

Two recent headlines from the *Halifax Chronicle Herald* capture the reality of the risks involved in the mining industry:

"Years of working dangerously: at least 33 have died in Canada's mines since Westray"(50)

"Mining still this country's most dangerous job"(51)

Mining is a dangerous occupation. Accidents and deaths occur for a variety of reasons including flaws in mine design, smaller workforces and more overtime work, and lack of adherence to safety regulations

(52,53, 54). Some members of the mining industry blame the increase in accidents and fatalities on "improper motivation" on the part of the employees.(55) The facts suggests that this is not the case. Between 1992 and 1997, explosions, cave-ins, heavy machinery and noxious gases claimed the lives of 50 miners in Canada, 27 of them coal miners and the rest hardrock miners.(51)

Deaths underground have ripple effects throughout a small community. This is particularly true when many miners die in a single calamity, as at Westray.(50)

Many mines are being proposed for remote northern regions of Canada, where permafrost conditions prevail. Building on permafrost requires advanced engineering skills and knowledge, and if mine infrastructure is improperly designed or constructed accidents can occur. An incident in the Yukon highlights the potential impacts that can be expected from permafrost melt. An explosion that injured 11 workers was attributed to ground movement caused by changing temperatures that ruptured propane pipes.(56)

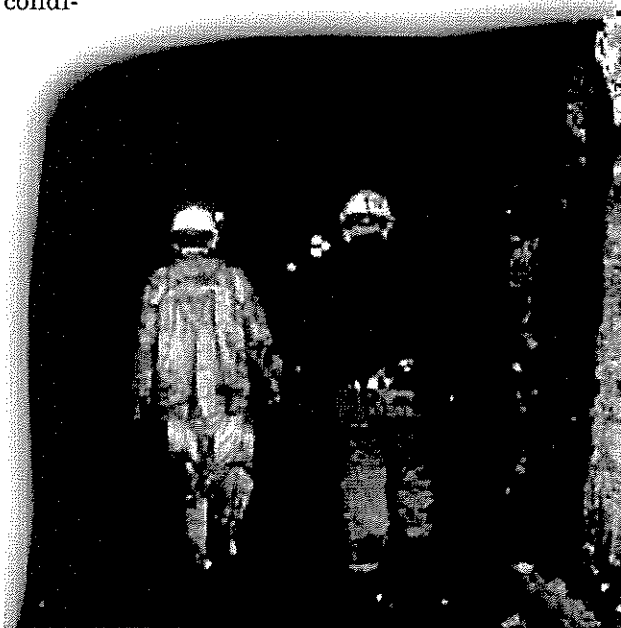
There are particular problems at remote mine sites where employees are flown in and live at the mine for specific periods of time. As one study points out, fly-in workers often suffer stress and tension as a result of separation from family and community. Coupled with overtime hours on the job, this stress may contribute to an increase in workplace accidents.(41)

There is a need to address these

issues because of the likelihood of more "urban miners", as southern ore bodies are depleted and companies develop more mines in remote areas. Also, there are many mines that are only projected to operate for a few years, which discourages the creation of new mining towns and encourages the trend toward flying in workers.

Training

Following the deaths of five miners in separate accidents in Quebec, Coroner Gilles Perron concluded that the province's miners need better training.(57) Perron said work methods are a factor in 90 percent of accidents underground.



Underground mines have particular health and safety challenges

The miners' union said the coroner's report underlines the lack of concern by mining companies for employees. "Clear signals of danger were ignored by the supervisors so as not to reduce production," said Arnold Dugas, director of the United Steelworkers of America.

Health and Safety

(Continued from page 22)

\$15,000 for failing to ensure a front-end loader was equipped with parking brake, and \$5,000 for failing to ensure that oxygen was available in its first-aid vehicle.

53

Explosives stored in wrong places, inspectors find (*Vancouver Sun*, 10/16/92, B11)

Safety inspectors who went through the Giant gold mine in Yellowknife (where an explosion had recently killed nine men) found explosives where they shouldn't have been. Blasting caps, stick powder and bags of explosives were found in more than 20 improper locations at the mine owned by Royal Oak Mines.

54

Inco fined \$525,000 over deaths (*Financial Post*, v.9(45), 04/23/96, p. 59)

The Ontario Ministry of Labour fined Inco Ltd. \$525,000 for violations of the *Occupational Health and Safety Act* that led to the deaths of three mine workers. Inco pleaded guilty to all charges.

55

Improper motivation main cause of accidents (*Northern Miner*, v. 79(14), 06/07/93, p. 14)

During the 1980s, Ontario averaged 11 mining-related deaths per year, most of which occurred underground. In 1993, 2,800 accidents were reported to the Ontario Workers' Compensation Board. The industry cited "improperly motivated" employees as the basic cause for most accidents.

At Falconbridge's Kidd Creek mine in Timmins, the safety record is particularly good. According to the mine manager, their safety record is, in part, the result of suggestions from employees. This stellar record may be at risk, however, with the elimination of 250 jobs, which raises concerns about worker safety.

56

Shifting ground blamed for blast (*Vancouver Sun*, 12/24/91, A3)

Eleven workers at the Sa Dena Hes lead-zinc mine in the Yukon were injured as they slept in their bunkhouse trailer. Ground movement, caused by

(Continued on page 24)

Health and Safety

(Continued from page 23)

changing temperatures, ruptured propane pipes, spilling gas beneath the trailer. The gas was likely ignited by a furnace-pilot light or the furnace itself.

57

Coroner calls for better training for miners after 5 deaths

(*Montreal Gazette*, 07/24/96)

All five of the deaths resulted when miners were crushed by falling rocks. Only 14 of 40 mines offer training programs in Quebec. In Ontario, where miners are required to take extensive training, accidents have dropped by 21 percent.

The coroner, Gilles Perron, wants all miners to be trained, and he wants Quebec to set up a mining school in northwestern Quebec. Perron also urged the work-safety commission to make sure sub-contractors respect Quebec safety rules.

Deregulation

If employers do not always have worker safety foremost in mind, at least government safety inspectors have the ability to halt operations that pose a potential danger to workers. Or at least that used to be the case.

In a disturbing trend, governments across the country are cutting back on occupational health and safety enforcement. In Alberta, more than half of the health and safety inspectors were laid off, leaving employers to essentially inspect and police themselves. Similarly, in Ontario, the Ministry of Labour has downsized to the point where inspectors can't afford to visit remote mine

sites.(51)

This trend has labour activists in Canada very concerned.

"Deregulation kills people. It's as simple as that," said Andy King, national health and safety coordinator for the United Steelworkers of America.(51)

"Business people are gamblers," says Vern Edwards, a safety official with the Ontario Federation of Labour. "They'll cut corners on health and safety for the sake of production and profits and just cross their fingers nothing happens. Unfortunately, they're not the ones who pay the price of losing that gamble."(51)

Conclusions: A Long Road Ahead

To a certain extent, the health and safety effects suffered by miners and mine and smelting communities are inherent to the industry and the mine environment. Yet many of the worst impacts could be mitigated or prevented with appropriate workplace investments.

The long and often bloody history of mining has produced some strong and progressive labour unions. Mine workers and their families are among the first to feel the impact of poorly designed mines. Over the years, labour activism has been the

most important force in improving the safety of the mine environment.

However, the shocking allegations of company and government negligence that came out in the Westray inquiry underscore the distance the mining industry still has to come.

The continued failure of companies like Royal Oak at their Giant Mine to address the health impacts of their operations speaks of an industry that is in too many cases still focused on profit at the expense of workers and communities.

Environmental Assessment

This package has so far dealt with the impacts associated with mining developments. However, there are opportunities for identifying potential impacts *before* mines are developed.

During the exploration stage, permits to dig, divert water, and so on, must be obtained. At the mineral development stage, however, all major mining projects in Canada have to go through an environmental assessment (EA) process to determine if and how development should proceed.

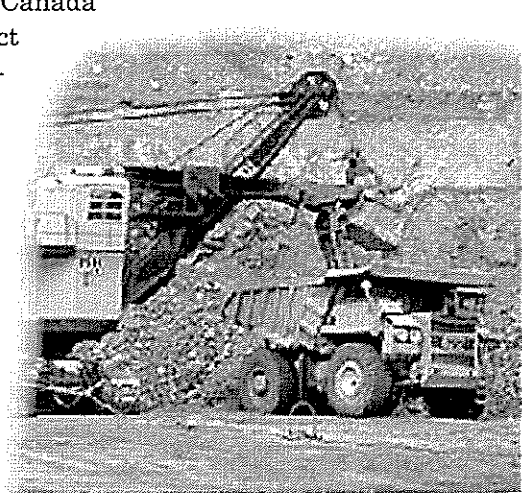
Background: the Origins Of EA

Environmental assessment in Canada was created to ensure that environmental concerns are adequately considered in decision making. Unfortunately, the current state of EA processes in Canada has been the subject of substantial criticism and increasing cynicism from many stakeholders.

Twenty years ago, the Berger Inquiry set the standard for EAs in Canada. Justice Thomas Berger established that: "environment" must include human social and cultural concerns; all those affected have a right to a fair hearing and to have their concerns incorporated into the decision making process; and traditional knowledge should be combined with Western science-based information to provide the best possible information base for decision making. He also made it clear that none of this could be accomplished without adequate time

for a thorough review.(58)

Since Berger, there hasn't been a single assessment conducted in Canada that has met the standards of the Berger Inquiry.(37)



Impacts are best dealt with before the the pit is dug

Presently in Canada, all provinces and the federal government have EA legislation. North of 60°, the federal process generally applies; however, the EA regime in the territories continues to evolve through the ongoing settle-

ment of land claims and self-government agreements.(59)

For all other regions, the responsibility for regulating and assessing mining operations rests with provincial governments. Occasionally, mining projects in the provinces also require federal approval (for example, when mine proposals include the destruction or alteration of fish habitat). When this is the case, the two

Environmental Assessment

Articles with underlined titles are available in photocopy form from the Environmental Mining Council of British Columbia.

58

Justice Thomas Berger. **Northern Frontier, Northern Homeland: the report of the Mackenzie Valley Pipeline Inquiry, Volume 1** (Ottawa: DIAND, 1977)

59

Marbek Resources Consultants. 1998. **Guide to information requirements for the environmental assessment of mining projects in Canada** (prepared for Environment Canada, the Canadian Environmental Assessment Agency, and Natural Resources Canada)

This report documents the legislative requirements for EA of mining projects in Canada. It also outlines the information that companies must produce to meet the requirements of the EA process.

60

Killer Gold permit stirs court action (*Alternatives*, v.21(2), 1995, p. 11)

The Yukon Conservation Society (YCS) is suing the federal government for its refusal to require a comprehensive environmental assessment of exploration work on a block of mineral claims in the Yukon. Jennifer Ellis, executive director of YCS says, "allowing mineral exploration in this area is appalling when wolves are being killed to ease pressures on the local caribou. Almost 100 wolves have been killed so far in the name of protecting this caribou herd, yet the federal government is refusing to even consider the environmental impacts of a mining proposal that could have severe repercussions for the herd."

Environmental Assessment

61

Conservation group launches lawsuits challenging Westmin mining in Yukon

(*Vancouver Sun*, 05/26/94, C10)

The Canadian Parks and Wilderness Society (CPAWS) has initiated two lawsuits aimed at the federal government and Westmin Resources, which is exploring its mineral claim near the Bonnet Plume River in the Yukon. CPAWS says the Department of Indian and Northern Affairs allows mining companies to log, bulldoze and build airstrips, camps and roads without first assessing whether the work harms the environment.

62

Canadian Arctic Resources Committee. Critique of the BHP Environmental Assessment: Purpose, Structure and Process

(*Northern Perspectives*, V,24(1-4), Fall/Winter 1996. pp. 7-9)

63

Biologist balks at Kemess request for new mill location

(*Vancouver Sun*, 07/23/96, C7,8)

The suggestion that the location of the mill be moved to a new site is "a significant change," says Gordon Ennis, habitat biologist with the federal fisheries department. It creates "potential for significant adverse impact [on fish]."

Whereas the original mill site was located several kilometres away from Kemess Creek, the new site is on a bench about 200 metres away. The creek is home to Dolly Varden and brown trout, a species listed as vulnerable in BC.

64

Diamond-mine scrutiny called 'shoddy' (*Globe & Mail*, 07/18/96, A8)

Critics warn that enthusiasm over the mine's benefits has overshadowed a lack of adequate scrutiny of its potentially harmful effects on land, animals and the human communities. They say the federal environmental-approval process has been reduced to little more than a cursory overview.

EA processes are usually merged or "harmonized," to save time and costs

for all parties involved.

Benefits of EA

In theory, environmental assessment focuses on predicting and assessing the ecological, social and related consequences of proposed developments, and on identifying ways to mitigate negative effects and optimize benefits. If properly conducted, EA processes should reveal if and how proposed projects can be implemented without unacceptable impacts.

For mining companies, a well coordinated EA of a proposed mining

project can contribute significantly to effective planning. By identifying potential problems with, for example, mine design and waste handling plans, and by bringing to light the full range of potential impacts and alternative ways of carrying out the project *before* the mine is developed, EAs can help to reduce costs and unscheduled project delays and minimize future economic and environmental liabilities.(59)

Criticisms of EA

There are many criticisms regarding how the EA process is applied to mining in Canada today. These include lack of assessment at the exploration stage, insufficient opportunity for concerned citizens to participate in the process, lack of adequate scrutiny of projects, inadequate time given to the reviews, and conflict of interest issues that arise when the government is both financer and regulator of a project.

EA lacking for exploration phase

As outlined in the section on Environmental Impacts, there are many potential impacts related to the exploration phase. Yet in many jurisdictions there is no process to evaluate these impacts, especially the cumulative impacts of exploration rushes, prior to exploration. In the Yukon, several lawsuits have been launched against the federal government for failing to assess the

impacts of exploration activities on the environment.(60,61)

Inadequate opportunity for citizen participation

In Labrador, there are few examples of consultation between government departments on assessing the potential impacts of exploration activities.(5) What little consultation that does exist is often hampered by the absence of critical baseline data on wildlife populations and distributions, key habitat areas and archaeological sites. According to the Innu Nation, even those rare instances where baseline data exist, there is a serious deficit in the basic ecological and cultural research required to interpret the data correctly in order to make informed decisions.(5)

As part of the environmental review of BHP's Ekati diamond mine in the NWT, hearings were held in communities likely to be affected by the mine.

Kevin O'Reilly, staff member with the Canadian Arctic Resources Committee (CARC), has commented that the BHP review was neither rigorous nor procedurally fair. Communities were not adequately included, in part because the EA panel was operating with very limited time and financial resources.(62)

Prior to the hearings, people were given several months to prepare. However, there were many barriers to participating in this process. The company's environmental impact statement (EIS), which was almost 1,000 pages long, became available at a time when many people were out of communities and busy with their traditional harvesting activities. Funding was limited and did not allow for adequate preparation of detailed arguments and positions. For example, because the EIS was written in a very technical language and was only available in English, preparatory discussions and workshops were necessary in communities where English was not a first language in order to prepare responses for the hearings. No resources or time had been allocated for these purposes.(37)

Only \$254,000 was paid to intervenors during the BHP review. "We have a limited budget," said Michel Dorais, head of the Canadian Environmental Assessment Agency, which administers the Federal EA Act, and distributes intervenor funding.(64) The federal agency could not find sufficient funding to evaluate the potential impacts of the project on communities, yet the federal government expects to receive an estimated \$2.5 billion in royalties and taxes from the Ekati project.(37)

The Canadian Arctic Resources Committee has noted that other environmental reviews, some of much less technical complexity, have received more intervenor funding than the BHP review. The Pearson International Airport Expansion panel received just over \$1 million; close to \$4 million in funding was allocated for the Great Whale project; and the Northern Diseased Bison review—scarcely the revenue-generating project that the BHP project is—was given more than



The roads and camps built to collect core samples and do other exploration work can leave a lasting mark on the landscape

\$500,000.(64)

Lack of scientific and technical scrutiny

EA reviews have been criticized as being less than rigorous in their scrutiny of mining projects.

In 1996, Royal Oak's Kemess mine in northern BC received both provincial and federal approval after going through an environmental review process, which the BC environment minister at the time, Moe Sihota, called a "sound and thorough environ-

Environmental Assessment

65

Diamonds in the Rough (*Nature Canada*, Fall, 1994, pp. 21-31)

This magazine article, written by Ed Struzik, provides an overview of the concerns voiced by different parties involved in the BHP Ekati diamond mine project in the Northwest Territories. These include opinions from industry, First Nation, community and environmental groups.

66

Canadian Institute of Resource Law. 1997. **Independent Review of the BHP Diamond Mine Process** (A report prepared for the Department of Indian Affairs and Northern Development)

67

The Pits: BC's Huckleberry mine raises more concerns about flaws in the environmental assessment and conflicts of interest in government (*Alternatives*, 23(2), Spring 1997, pp. 4, 5)

The BC government has been involved in the Huckleberry mining project from the beginning. Princeton Mining Corp., was given a \$15 million infrastructure loan to complete the project. Information released by the Canadian Taxpayer's Federation indicates that an Order-in-Council was also used to extinguish a \$28.8 million government loan owed by Princeton's former wholly owned subsidiary, Cassiar Mining Corp.

68

Taku River Tlingit First Nation (TRTFN). March 6, 1998. **Tulsequah Chief mine re-opening project: report and recommendations of the TRTFN, project committee member, with respect to a decision on a project approval certificate by the minister of environment, lands and parks and the minister of energy and mines.**

This document is available on-line at

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the following address: http://em-cbc.miningwatch.org/library/tulsequah_TRTFN.htm

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Auditor General of Canada. **1998 Report of the Commissioner of the Environment and Sustainable Development. Chapter six: Environmental**

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mental assessment." Yet, only a couple months after the project was approved, the company revealed that the soils at the location of the planned mill site were unstable.

"It suggests that somebody did not do their homework," said Rosemary Fox of the Sierra Club. "It shatters one's confidence in the integrity of the review process."

The company wanted to move the mill to a location that was specifically rejected during the EA process. Fox said this proposal made "a mock-

ery of both the provincial and federal environmental processes."(63)

Critics of the BHP federal environmental review have called it "a shoddy and hurried assessment."(64)

The head of the Canadian Environmental Assessment Agency acknowledged that the federal EA process has become more hurried in recent years. "These things were not a problem a few years ago, when we had two major projects to assess a year and no budget problems. . . but now we have six major panels a year

Case Study: Tulsequah Chief

Major controversies erupted following the approval of Redfern Resource's Tulsequah Chief mine proposal to reopen an old Cominco mine and build a 160-km road into the Taku, a roadless wilderness area in northwestern BC.

Concerns with the proposal and assessment process came from a number of camps: the Taku River Tlingit First Nation (TRTFN) expressed concerns about how the mine would impact the future of their land and their people; the Alaskan government raised fears that the mine and subsequent developments would damage their lucrative salmon fishery; and environmentalists argued that the mine access road would open up the area to unsustainable levels of logging, increased mineral exploration and development, disruption of grizzly bear and caribou habitat and the long-term degradation of the area.(16)

Janet Kowalski, director of habitat for the Alaska Department of Fish and Game, said that BC's environmental review failed to answer key questions, including what impact the project will have on the millions of sockeye, coho and chinook salmon in the Taku River. The proposed mine is located on the Tulsequah River, a major tributary of the Taku River. The Alaskans are concerned about "inadequate tailings disposal" on the flood plain of a major salmon river, in an area prone to earthquakes and floods. Kowalski said her state is pro-mining but would never allow such a project.(16,18,19,20)

Don Weir of the Taku Wilderness Association said he understands that you have to share the wilderness, but proper environmental reviews are fundamental to making decisions about development. This one, he said, was deeply flawed because key questions identified in the EA were never answered, about habitat impacts, access management and long term toxic waste problems. The many documents filed by the company did not address key local issues and were not of a quality that gave people confidence in the process.

The Tulsequah Chief mine project was subject to both a provincial and federal assessment. The Alaskans,

the Tlingit and environmentalists contributed to the BC environmental review, but all were given less than 48 hours to review a draft of the 104-page project-committee report.

The public process was circumvented and effectively aborted at a critical stage despite deficiencies identified by many participants. The TRTFN, a member of the EA project review committee, issued a detailed critique of the draft report in which they identified major deficiencies in the data and assessment.(68) In spite of their objections, the BC government rapidly approved the mine.

The desire to expedite the Tulsequah Chief mine overran government's commitment to due process and environmental protection.

Recently, the Auditor-General's Office found serious deficiencies in the federal EA process and noted that Ottawa often fails to ensure that companies follow up on their promises to mitigate environmental damage.(69)

Further criticism has come from the House of Commons environment committee, which has condemned Ottawa for not enforcing crucial laws, especially in remote areas like the Pacific Northwest.(70)

The BC assessment of the Tulsequah Chief mine came shortly after the federal government agreed to "harmonize" its EA rules with those of the provinces, a move environmentalists claim opened the door to perfunctory reviews.

Brian Jack, a member of the Tlingit First Nation has worked to re-establish a Native fishery in the upper Taku watershed. He says he has lost his faith in environmental reviews, and in the ability of both British Columbia and the federal government to protect the land that has become his life. Weir argues that it is local people, such as Brian Jack and the other fishermen and fisherwomen who depend on the Taku, who will pay the price for the inadequate assessment of the project.(16)

and a limited budget.”(64)

Bill Fuller, a retired zoologist from the University of Alberta, appeared in front of the EA panel the BHP project. He told the panel that more analysis was needed on caribou, as well as on the eating and migratory habits of other northern animals such as fox and grizzly bears.

“They’re spending billions on this,” said Fuller. “Why can’t [the company] wait a year or two? Then we’ll know better what sort of restrictions need to be put on.”(3)

David Schindler, a professor at the University of Alberta, also appeared in front of the panel as a technical expert. He was shocked by the speed with which the environmental hearings were held, given the amount of data that had to be reviewed. “I thought they would have wanted me for half a day, not fifteen minutes.”(3)

An environmental review, by pursuing standards of comprehensiveness, rigour and fairness, is intended to give the government impartial advice on whether a project should proceed, and if so, under what conditions.

Mining projects are complex and technical by nature. It follows, therefore, that EA panels should take time to examine the technical issues in order to fully understand the implications of the project before making recommendations on

whether or not it should be developed.

This was not the case with the BHP environmental review. An article written by CARC documents the panel’s failure to address technical issues.(62) The article relates that during the course of the BHP hearings the panel chair stated, “I would also like to stress that this is not a technical review per se.” Furthermore, the panel did not retain legal or technical experts to help it frame its own interests, raise questions, or assist others to explore technical issues. It is possible that the panel expected government agencies to come forward with sound technical analyses of the proposal. Some did, notably the NWT Department of Renewable Resources. Others, however, did little to advance the technical investigation. Some departments were absent from the proceedings, hardly in keeping with the panel’s request



The historic Tulsequah Chief mine releases acid drainage into the Tulsequah River, a major tributary of the Taku

for information from all relevant and involved agencies.

As CARC asked, “If the BHP review was not intended to examine technical aspects of the project, under whose auspices and when will

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Assessment – a critical tool for sustainable development

Environmental assessment is supposed to identify potentially significant adverse environmental effects and any mitigation measures that will reduce them to insignificance. Federal authorities have generally been including mitigation measures in the terms and conditions of their approval, or building them into related contract documents. It is less obvious from the information provided to us that responsible authorities verified whether mitigation measures were actually implemented by project proponents. In some cases, departments said they had to allocate scarce resources to activities other than the monitoring of mitigation.

This report can be found at the following web address: http://www.oag-bvg.gc.ca/domino/reports.nsf/html/c8menu_e.html

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Standing Committee on Environment and Sustainable Development. **Report 3, Enforcing Canada's Pollution Laws: The Public Interest Must Come First!. Canadian Environmental Protection Act enforcement study** (Tabled in the House May 25, 1998)

Based on the evidence before it, the Committee concluded that Canadians are not getting the high level of environmental protection that they deserve. A number of problems with enforcement were raised by the the Committee.

One major impediment concerned the lack of both human and financial resources required to meet the challenges of an ever-increasing workload.

Under the federal government's program review, Environment Canada has had to reduce its overall budget by about 40%. An example of the effects of the Green Plan's expiry was provided by Peter Krahn, Head of the Inspections Division for the Pacific and Yukon Region. He said that on April 1, 1998 his region's inspection budget will drop by 30%. With respect to the ability to inspect, Krahn expects that inspections will drop from 550 down to about 385, while investigations in progress will drop

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from 25 down to about 16.

Web address for the report: <http://www.parl.gc.ca/InfoComDoc/ENSU/Studies/Reports/ensurp03-e.htm>

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The Great Giveaway: a flawed process led the province's approval of northern B.C. mine
(*Nanaimo Times*, 01/16/96)

The Cheslatta Carrier Nation has petitioned the BC Supreme Court to set aside the province's decision to approve the Huckleberry copper mine in northwestern BC. The petition, filed by Sierra Legal Defence Fund on behalf of the Cheslatta, claims that the provincial government failed to abide by the requirements of the *Environmental Assessment Act* by accepting the mining company's incomplete project report and approving the project.

such a review take place?"(62)

In addition to a lack of consideration of technical issues, the cumulative impacts of mining proposals are often not given adequate consideration during environmental assessments and reviews.

The Ekati diamond mine in the NWT became a major focus of attention for northern interest groups and First Nations because it is likely to be the first of many diamond mines. As well, the potential infrastructure required to service these mines (e.g., roads, powerlines) has a high likelihood of attracting other industrial developments previously considered uneconomical. In short, development of BHP's Ekati mine could lead to a transformation of the physical and economic face of the Far North.

"Even when an environmental screening is done there are serious flaws in the process," says Stewart Elgie, lawyer with the Sierra Legal Defence Fund. "First, government regulators don't have the baseline data to make environmental predictions because the science required to determine how watersheds will be affected – or how grizzly bears, wolves and other animals are going to respond to the activity – has not been done. Secondly, the governments are basing their decision on the impact of one project, not on the cumulative impacts of all that is going on in the diamond mining territory. In essence, the whole in this case is far bigger than the sum of its parts."(65)

The Canadian Arctic Resources Committee echoes Elgie's comments. They have written that, "What should have been a comprehensive regional assessment now stands as a very limited analysis of a single project, with reference neither to the po-

tential for greater development nor to long-term cumulative effects."(37)

Virtually everyone involved in the BHP public hearings expected the EA panel to recommend clear, detailed terms and conditions to minimize environmental costs and maximize economic benefits to aboriginal peoples and other northerners. However, the failure of the EA panel to provide adequate scrutiny of the potential

and cumulative impacts of the project resulted in recommendations that were perceived as being too general to be very helpful.(66)

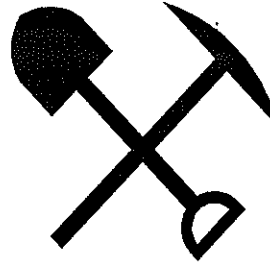
Conflict of interest issues

In addition to budgetary problems reducing the scope and amount of participation in the assessment process, there are other pressures that may be contributing to the fast-tracking of proposals through the EA stage.

The rush for the promise of jobs and tax revenues can and has created conflicts for governments who have the responsibility of regulating the environmental impact of mining projects.

In some cases, the government may also have a direct stake in a proposed mine.

The province of BC was both an investor and regulator of Princeton Mining Corp.'s Huckleberry Mine project in northwestern BC.(67) In December, 1996, the BC government approved the copper mine project, even though the company had not "submitted cost projections for long-term monitoring and maintenance of the facility after closure . . . conducted fish tissue sampling to determine background levels of mercury and other metals . . . provided model-



ing of long-term pit water quality. . . or assessed the impact on humans of mine discharge.”(71) All of this information was required by the project report specifications outlined by

the provincial government. Just a few months later, the company received a \$15 million infrastructure loan to complete their project.(71)

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Public Action

Citizen efforts can and do make a significant difference in reducing the impacts of mining. There are no hard and fast rules for individuals or community organizations wishing to take action on mining impacts, but the following are some pointers for getting started.

Research. Learn everything you can about the company, the mine site, current proposals, and the local environment. Read up on regulations, find out who's responsible in the company and in government. Where necessary, get expert help to understand and respond to technical issues.

Document. Take photos or video footage, get copies of permits, produce position papers or reports, get it in writing.

Network. Get an existing organization active on the issue, or put together a new network. Get spokespeople who know their stuff. Talk to mine union locals, First Nations, environmental groups, fishery or

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Conclusions: the Future of EA

As Susan Wismar writes, “Experience to date with the BHP review raises serious questions about the state of environmental assessment in Canada. As a regulatory and planning mechanism designed to ensure fair, effective and efficient decision making, it does not seem to be working.”(37)

David Schindler, internationally renowned scientist and professor at the University of Alberta, participated in the BHP process. Schindler says that he believes it is time for the federal review process to be given the means and legal power to conduct its business. “It’s really disgraceful the way it operates now,” he says. “This kind of thing is a throw-back to the Dark Ages, and I can’t help but think that as a country, we’ll some day regret that there was so much hurry to give so much away to the multinationals when there was plenty of time to think this thing through. After all, the diamonds aren’t going to go away.”(65)

In the 1970s, many people saw the Berger Inquiry as the beginning of an era in which environmental assessment could be used to balance out the inequities inherent in large-scale resource development projects, ensure accountability and inject a suitable tone of precaution into decision making. Experience with federal and provincial review processes suggests, however, the Berger Inquiry may have been the high point of an era, rather than its

beginning.(37)

EA is supposed to determine whether mining projects can be developed without having unacceptable impacts.

In order to truly understand the breadth of potential impacts, and develop strategies to prevent or mitigate these impacts, there is a need to ensure thorough scrutiny of development proposals.

When EA hearings are held, it is the responsibility of EA panels to conduct environmental reviews that:

- ♦ include human social and cultural concerns, in addition to ecosystem impacts;
- ♦ provide a fair hearing to all affected parties and incorporate their concerns into the decision making process;



In the absence of adequate assessment, mineral exploration and development can leave a geography of devastation in its wake

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wildlife organizations, and government ministry staff.

Strategize. Talk out your options, develop scenarios, anticipate possible responses, lay out your positions and your bottom line. Decide where and when to bend, and where to stand firm. Focus on identifying achievable goals. A key question here is: are you trying to stop a mine, or to improve it?

Educate. Publish fact sheets, hold slide shows or information sessions. Make maps, contribute articles to newsletters.

Advocate. Attend meetings, speak up, talk and write to mine managers and government officials. Make your position heard on committees. Speak knowledgeably to the issues.

Publicize. Hold press briefings, announce reports, respond to developments.

Monitor. The best plan is only worthwhile if it is actually carried out. Check up, ground truth. Make sure that agreements are lived up to, and take action if they are not.

Celebrate. Don't be all doom and gloom. Acknowledge positive changes. Thank your colleagues. Celebrate successes, small and large.

- ♦ take into consideration traditional knowledge as well as detailed, technical Western-science-based information;
- ♦ address the question of long-term, cumulative impacts of the project;
- ♦ seriously consider alternatives to the project and alternative ways of carrying out the project; and
- ♦ allocate enough time for a thorough review.

Due consideration of all of the above factors is essential if EA panels are to make informed recommendations on whether the development should proceed, and if so, what types of mitigative measures need to be undertaken.

Throughout the EA process, there must be a greater commitment on the part of governments at both the provincial and federal levels to seriously address all parties' concerns. Only then will regulators be able to make informed decisions as to what is "acceptable" to all people potentially affected by a mining development.

Mining is only one of a spectrum of development options in any area. At the end of the day, if it is shown that impacts cannot be mitigated or prevented, governments must have the integrity and political will to decide that a mining project is not an appropriate development for a particular community or region.

Appendix: Articles

Appendix: Articles

The following articles, intended to provide contextual information on the subjects covered in this kit, are available in photocopy form from the Environmental Mining Council of British Columbia. They are numbered according to their appearance in this kit. Not all of the articles cited in the text are included.

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| <ul style="list-style-type: none"> (1) Deal reached to protect Arctic wilderness sites (3) Diamonds in the rough - - BHP's mine in Canada's Barrens has the potential for causing big environmental and social disruption (4) Raglan's success sparks exploration boom in Nunavik (6) Diesel spill at Windy craggy (7) Labrador miners accused of littering (8) Diamond miners face environmental charges (9) Lake-area land use permit draws fire (10) Mining boom called bust for northern wildlife (13) Support grows for deep-sea port at Bathurst Inlet (16) Troubled waters: the Taku dilemma (17) Environmentalists battle Omineca mine road (18) Have the north's grizzlies met their match in mine road (19) B.C. Natives vow they'll go to court to stop mining road (20) Proposal for B.C. mine may fuel Pacific fish fight (22) Breaking up rock sets off production of toxic cocktail (24) Tsolum: Concern for this damaged river grows (25) Mine's seepage poses threat to river (26) Royal Oak fined for Back Bay pollution (27) Mining's Dam Problem (29) Alaska mining company agrees to \$4.7 million environmental settlement (30) Creek damage investigated: dirt from mine construction running into (31) Curragh lays off 177, may close Faro mine (33) Company pledges jobs for Natives (34) Falconbridge signs historic deal with Inuit (36) Training of Inuit stepped up at Raglan | <ul style="list-style-type: none"> mine (41) Miners sent to remote sites to work suffer from stress (42) Land claims threaten NWT diamond mine (45) Panel makes connection between hardrock mining and cancer (46) Study evaluates cancer risks for nickel miners (47) Mystery ailments fell Fording coal miners (48) Canada's uranium mining sparks desperate protest (49) Zero arsenic discharge possible (50) Years of working dangerously: at least 33 have died in Canada's mines since Westray (51) Mining still this country's most dangerous job (52) Curragh Inc. fined \$20 000 for safety offences (53) Explosives stored in wrong places, inspectors find (54) Inco fined \$525,000 over deaths (55) Improper motivation main cause of accidents (56) Shifting ground blamed for blast (57) Coroner calls for better training for miners after 5 deaths (60) Killer Gold permit stirs court action (61) Conservation group launches lawsuits challenging Westmin mining in Yukon (62) Critique of the BHP environmental assessment: purpose, structure and (63) Biologist balks at Kemess request for new mill location (64) Diamond-mine scrutiny called 'shoddy' (67) The Pits: BC's Huckleberry mine raises more concerns about flaws in the environmental assessment and conflicts of interest in government |
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