

Mining Contaminants and First Nations Environmental Health

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First Nations
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What is FNEHIN?

- A 'virtual network' linking First Nations and environmental health researchers to help build research capacity.
- Three main dimensions:
 1. **Access Point**
 2. **Knowledge Synthesis**
 3. **Mobilization of Knowledge**



Who Are We?

- Partnership-based initiative, with small research staff at UNBC in Prince George, BC (secretariat).
- 9 founding partners:
 - National Collaborating Centre for Aboriginal Health
 - National Collaborating Centre for Environmental Health
 - First Nations Inuit Health Branch, ERD
 - Canadian Water Network
 - Centre for Indigenous Environmental Resources
 - National Aboriginal Health Organization
 - BC Leadership Chair in Aboriginal Environmental Health
 - Assembly of First Nations
 - Public Health Agency of Canada
- Network Champion: Laurie Chan.

Why is FNEHIN Needed?

Listening to Community Concerns:

- Traditional Food safety
- Drinking Water Quality
- Outdoor and Indoor Air Quality
- Impacts of Industrial Developments
- Local waste disposal
- Promotion of healthy community



Mining Contaminants in BC

- Environmental legacy of past mines – approx. 1700.
- BC leads the nation in contaminated sites – approximately 8,000.
- Nearly all high-priority sites are past mines.
- Risk assessment of contaminated sites aimed at protecting human health.
- First Nations living closer to land more vulnerable to health impacts – traditional foods, medicines, water.

What are Contaminants?

- Particular types of non-living substances that can be harmful to plants, animals and people, or to the physical environment.
- Found in a place where it should not be or in a concentration greater than what is normally found in that area.
- Can be natural, or human-made.
- Three main transporters of contaminants are: wind currents; flows of rivers; and ocean currents.

Bioaccumulation of Contaminants

- When humans eat contaminated (even low-levels) plants, fish and other animals, contaminants can build up in us.

Bio- <i>concentration</i>	Bio- <i>accumulation</i>	Bio- <i>magnification</i>
The uptake of substances in an organism from water alone.	The more general term because it includes all means of uptake into the organism.	The increase in concentration of a substance, such as the pesticides, that occurs in a food chain. Occurs across food chain levels.
Occurs within an organism		

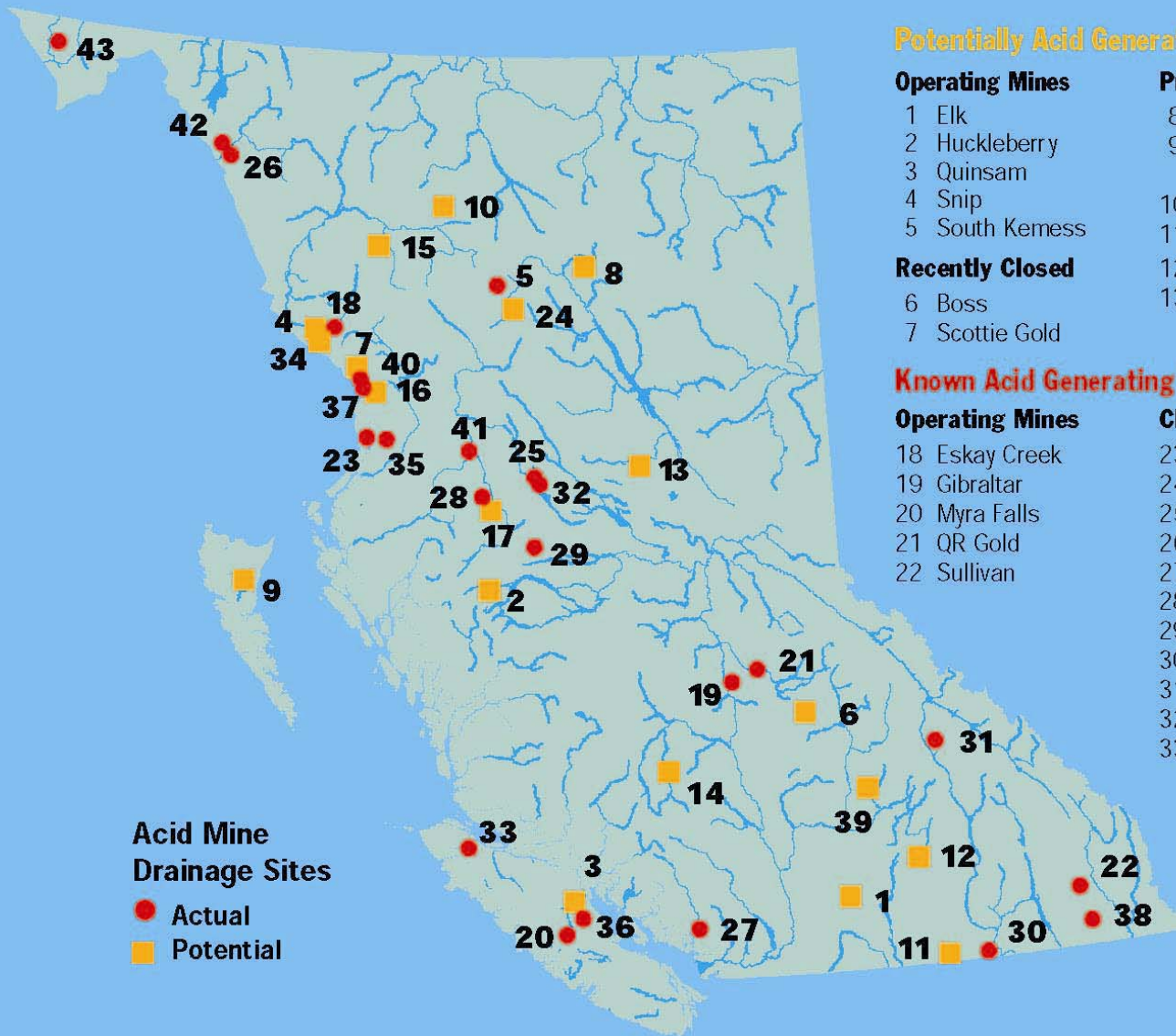


Common Mining Contaminants: Mercury

- Three different forms, the elemental (volatile liquid), organic, inorganic, can change from one form to another.
- Occurs naturally in environment.
- Used to be mined for, now only a by-product of gold mining.
- Fish most susceptible to mercury contamination – bioaccumulation in larger predatory fish.
- Extreme exposure in humans can result in death.
- Low-level exposure can be harmful to pregnant women and infants, affecting brain development.

Common Mining Contaminants: Acid Mine Drainage

- Intensified process of Acid Rock Drainage.
- Large quantities of rock containing sulphide minerals excavated, reacts with water and oxygen to create sulphuric acid.
- Acid is carried off the mine site by rainwater or surface drainage and deposited into nearby streams, rivers, lakes and groundwater.
- Most known health effects of sulphuric acid related to breathing in mist form, and ingesting in water.



Acid Mine Drainage Sites
 ● Actual
 ■ Potential

Potentially Acid Generating Mines

Operating Mines

- 1 Elk
- 2 Huckleberry
- 3 Quinsam
- 4 Snip
- 5 South Kerness

Recently Closed

- 6 Boss
- 7 Scottie Gold

Proposed Mines

- 8 Cirque
- 9 Harmony Gold (Cinola)
- 10 Kutcho Creek
- 11 Lexington
- 12 Lumby Muscovite
- 13 Mount Milligan

- 14 Prosperity (Fish Lake)
- 15 Red Chris
- 16 Red Mountain
- 17 Telkwa Coal
- 42 Tulsequah Chief (Redfern)

Known Acid Generating Mines

Operating Mines

- 18 Eskay Creek
- 19 Gibraltar
- 20 Myra Falls
- 21 QR Gold
- 22 Sullivan

Closed/Abandoned

- 23 Anyox
- 24 Baker
- 25 Bell
- 26 Big Bull
- 27 Britannia
- 28 Duthie
- 29 Equity
- 30 Giant Nickel
- 31 Goldstream
- 32 Granisle
- 33 Island Copper

- 34 Johnny Mountain
- 35 Kitsault
- 36 Mount Washington
- 37 Premier
- 38 Saint Eugene
- 39 Samatosum
- 40 Silver Butte
- 41 Silver Standard
- 42 Tulsequah Chief (Cominco)

Exploration Site

- 43 Windy Craggy

Sources: MEI Acid Rock Drainage Policy, June 1997; Draft Guideline for Metal Leaching and ARD at Mine Sites in BC, BC Ministry of Employment and Investment, Reclamation Section; BC Minfile, BC Ministry of Employment and Investment, Geological Survey Branch

AMD *cont'd*

- Government states there is no *direct* risk to public health from acid mine drainage. But that solubilization of various metals (aluminum, arsenic, cadmium, copper, lead, nickel, and zinc) makes it easier to enter streams and rivers.
- Contamination of streams and rivers by metals can cause problems downstream in fish, wildlife, and drinking water.
- Predicting AMD not exact science. U.S study found 89% of mines either underestimated or ignored the potential for AMD.
- 64% had failures in mitigation measures.



Common Mining Contaminants: Lead

- Occurs naturally in the environment, and trace amounts found in many foods.
- Lead is mined, and often associated with zinc ore deposits.
- By-product of Acid Mine Drainage.
- Small amounts of lead can be hazardous to human health,
- Has been characterized as a probable human carcinogen (cancer-causing agent).
- Lead poisoning extremely rare in Canada.
- Children very susceptible to lead, no safe amounts. Impairs brain development.
- Long-term exposure in adults = nervous system damage, kidney damage, impaired mental function.



Common Mining Contaminants: Copper

- Essential element to human health.
- Naturally occurring.
- Copper is mined, and is also a by-product of Acid Mine Drainage.
- Fish are most susceptible to copper contamination.
- Extreme exposure can result in: vomiting, stomach cramps, Jaundice.
- Long-term low level exposure: kidney/liver damage, infertility.

Common Mining Contaminants: Cadmium

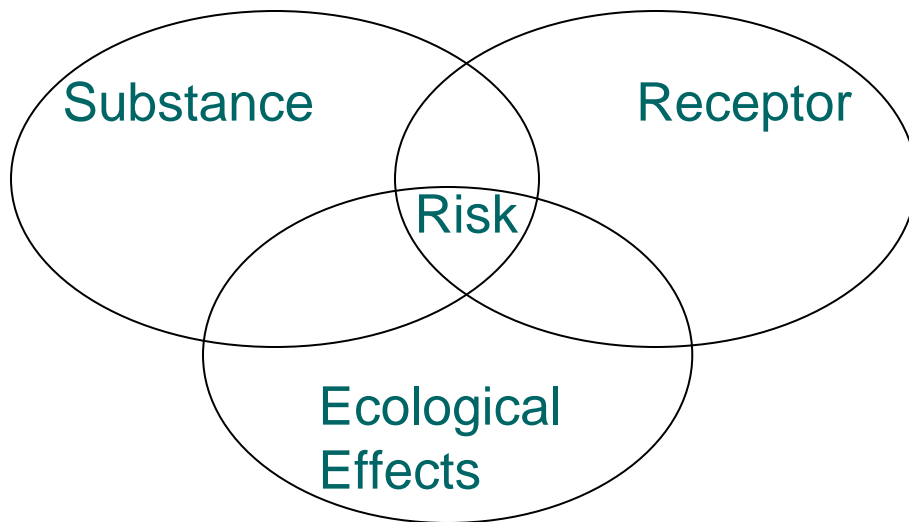
- A natural element, but can be a toxic metal.
- Released in air during mining.
- Does not break down, does bioaccumulate.
- Can be very toxic to aquatic organisms, even in small amounts.
- In humans, breathing high level can cause lung damage, death.
- Long-term, low-level exposure can cause lung and kidney damage, cancer.
- Effects on children unclear.

Common Mining Contaminants: Arsenic

- Naturally occurring, but toxic in high levels.
- By-product of AMD.
- Does not break down in environment, does bioaccumulate.
- Carcinogenic (cancer-causing).
- High-level exposure: Muscle pain, rashes, loss of movement, sensory responses.
- Long-term exposure: Thickening, discoloration of skin, decreased production of blood cells, abnormal heart rhythm.

A Note on Risk Assessment

- Risk Assessment: Evaluate and predict impacts – site specific.
- Estimate levels of risk to human and environmental health – mathematical model.



- BC – focus on cancer-causing agents.

- Risk Management: Manage risks/impacts to standards, using monitoring and inspection.



Researching Contaminants and Environmental Health

- Regional and national funding available.
- FNEHIN available to assist with proposal writing, research design, research partnerships.
- Researching past mines, or establish baseline for future mines.
- Test traditional foods, water, human hair and blood for contaminants.

Resources – Find Out More About Contaminants

- *Canadian Environmental Protection Act, Environmental Registry (Toxic Substances List):* www.ec.gc.ca/CEPARegistry
- National Pollutant Release Inventory: http://www.ec.gc.ca/CEPARegistry/subs_list/NPRI.cfm
- Crown Land Restoration Branch (BC Govt): <http://www.agf.gov.bc.ca/clad/ccs/>



Thank You!

For more information:

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