First Nations Environmental Health Innovation Network

COPPER

Fact Sheet

Copper is an essential element in human health, and copper-deficiency can result in a variety of disorders. Extremely high levels of copper can cause health problems, but this is rare. In nature, copper is usually associated with other metals such as zinc, nickel, molybdenum and gold. Copper is widespread in the environment and has been mined and used by humans for more than 5,000 years in utensils, coins, ornaments, and tools. British Columbia is the largest copper-producing province in Canada.

USES

- Heat & electrical conductorS
- Cookware
- Electrical circuits
- Household plumbing materials
- Coins
- Compounds to treat plant diseases (mildew)
- Wood, leather, and fabric preservatives
- Used extensively in pesticide formulations as a fungicide and antimicrobial agent, particularly for the treatment of wood and water supplies for drinking water and recreational use.

COPPER AND MINING

- Most copper is mined in open pits of low-grade rock containing chalcopyrite and other copper sulfides.
- The ore is concentrated by a flotation process.
- Acid mine drainage from copper mine sites have caused massive fish kills.
- Copper mining & smelting operations are major sources of contamination of source water and from the anode mud formed bentonite, and coal mining.

COPPER IN THE ENVIRONMENT

AIR: Copper enters atmosphere from soils, volcanoes, decaying vegetation, forest fires, sea spray & mining/smelting operations and is carried over very long distances by particles emitted by smelters & ore processing plants. It lands on the ground by snow/rain deposition or gravity.

SURFACE WATER: Tailings ponds contain copper. Copper affects fish in most life stages, but reproductive adults & embryos are probably most sensitive.

SOIL: Strongly attaches to organic materials and minerals.

COMMON SOURCES OF CONTAMINATION

- Corrosion of copper pipes used in home plumbing
- Mining operations
- Leachate from municipal landfills
- Sewage treatment plant sludges
- Textile mill & cosmetic plant wastes
- Burning of coal in power plants

Production of this document has been made possible through a financial contribution from Health Canada. The views expressed herein do not necessarily represent the views of Health Canada. These factsheets are not intended to provide medical advice, nor do they constitute alerts on potential contamination in specific water, food, or air systems. For up to date information on public health emergencies across Canada please go to: http://www.phac-aspc.gc.ca/ (Public Health Agency of Canada).

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Environmental Impact

Fish are known to be highly sensitive to elevated levels of copper. Fish can be affected in most life stages, but reproductive adults and embryos are most vulnerable.

The Tsolum River on Vancouver Island has been heavily impacted by copper mining. A whole run of salmon was nearly wiped out from copper contamination.

High levels of copper are also toxic to soil organisms.

High levels of copper and zinc together can increase toxicity to aquatic organisms.

Environmental Management Criteria for Copper

Copper is listed on the federal *Metal Mining Effluent Regulations* as a "deleterious substance."

Health Canada's aesthetic objective for copper in drinking water is below 1.0mg/L, for taste purposes mostly.

Human Health Effects

Copper is an essential element in human health, and health effects can result from both deficiencies and overexposures.

Metallic copper has little toxicity, but coppers soluble salts are poisonous, low levels of copper are essential for maintaining good health. The recommended daily intake for adults=2 mg/day.

Extremely high levels (more than 15 mg/day) of exposure can cause harmful effects such as:

- Skin allergies
- Irritation of the nose, mouth, and eyes
- Nausea
- Diarrhea
- Vomiting
- Stomach cramps
- Jaundice

Longer periods of exposure can result in kidney/liver damage. It may decrease fertility in adults.

Breathing copper containing dust or skin contact (in mining or processing ore) can cause death & liver/kidney diseases.

Low levels of exposure can result in: Gastrointestinal disturbance

The International Agency for Research on Cancer has not evaluated copper or copper compounds for carcinogenicity (cancer-causing).

For More Information

Health Canada
http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/water-eau/copper-cuivre/copper-cuivre-eng.pdf

Acid Mine Drainage: Mining and Water Pollution Issues in BC
http://www.miningwatch.ca/index.php?/AMD/AMD_booklet

Safe Drinking Water Foundation
http://www.safewater.org/PDFS/resourcesknowthefacts/Mining+and+Water+Pollution.pdf

Agency for Toxic Substances & Disease Registry
http://www.atsdr.cdc.gov/

CSP2 Fact Sheets Health & Environmental Effects of Trace Elements in Metal Mining Wastes
http://209.85.173.104/search?q=cache:5H-msLUonlIJ:www.csp2.org/reports/Fact_Sheets--Trace_Elements_in_Mining_Waste.pdf+CSP2+FACT+SHEETS&hl=en&ct=clnk&cd=2&gl=ca&client=firefox-a

Metal Mining Effluent Regulations
http://www.ec.gc.ca/nopp/docs/regs/mmer/mmer.pdf

Call us Toll-Free at 1-866-960-5223 for more environmental health resources