

## METALS OF CONCERN FACT SHEET SERIES

# ARSENIC

## HIGHLIGHTS

- Arsenic occurs naturally in rocks and minerals such as arsenopyrite.
- Natural erosion, volcanoes and mining activities are potential sources of arsenic in the environment.
- Micro-organisms are able to transform inorganic arsenic into organic arsenic compounds.
- Arsenic has been used both medicinally and as a poison for many years.
- Arsenic can be ingested, inhaled or absorbed through the skin.
- Both inorganic and organic arsenic can be excreted through urine; organic arsenic is considered less toxic because the body excretes it at a faster rate.
- Arsenic is not found in Yukon country foods at levels of concern.

## WHAT IS ARSENIC?

Arsenic is the 20th most abundant element in the earth's crust and is found in copper, lead, silver and gold. When combined with oxygen, sulphur and chlorine, inorganic arsenic salts are formed. These include the sulphide minerals arsenopyrite and realgar. Arsenic is also found naturally in the environment in organic compounds. These compounds are generally formed by bacteria in a process called methylation. Metallic or elemental arsenic is steel grey, brittle and rarely found naturally.

## HOW DOES ARSENIC ENTER THE ENVIRONMENT?

Arsenic has several industrial applications; the most important is its use in chemically preserved wood. Ninety percent of arsenic in Canada is made into the wood preservative chromated copper arsenate. Wood that has been treated with this chemical is referred to as pressure-treated wood. Arsenic is also used in batteries, ammunition, light-emitting diodes and electronics. Historically, Arsenic was used in fungicidal seed and crop insecticide but these uses are no longer legal.

Some of the arsenic mineralization in the Yukon is associated with gold ore deposits including those at Mount Freegold, Montana Mountain and Mount Nansen. While natural erosion and weathering releases arsenic into the environment in these areas, mining activity may increase the natural levels. The Indian and Northern Affairs Canada Waste Management Program has remediated certain sites by capping the mine tailings. Ongoing studies

are underway to measure the effectiveness of the caps in reducing arsenic release into the environment.

## IS ARSENIC TOXIC?

At very high concentrations, arsenic can be toxic or lethal to a wide range of organisms. Once treated with arsenic fungicides, crop yields decrease. Malformations have been found in amphibians in the areas around such crops.

Arsenic may be inhaled, ingested or, to a small extent, absorbed through the skin. When inorganic arsenic is taken into the human body, much of it (approximately 80%) is changed to organic arsenic and excreted in the urine. Inorganic arsenic that is not transformed tends to concentrate in the hair, skin and nails during the first two weeks of exposure; then elevated levels may appear in the liver, spleen, kidney and muscle tissue. Fish undergo a similar detoxification process through which the inorganic arsenic is changed to organic arsenic and excreted in urine. Organic arsenic is considered to be less toxic than inorganic arsenic because it is excreted at a much faster rate.

Arsenic is considered a carcinogen but is also presently used in some medicines to treat leukemia, a form of cancer. If, over an extended period of time, arsenic is absorbed at a faster rate than the body can clear it, the metal can accumulate in the body. People who have been chronically exposed to arsenic have suffered skin damage, problems with their circulatory system and have an increased risk of cancer.

## WHERE TO FIND MORE INFORMATION ON THE WEB:

- **Health Canada**  
<http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/environ/index-eng.php>  
<http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/index-eng.php>
- **Environment Canada**  
<http://www.chemicalsubstanceschimiques.gc.ca/index-eng.php>  
[http://www.ec.gc.ca/toxics/wood-bois/over/iac\\_e.htm](http://www.ec.gc.ca/toxics/wood-bois/over/iac_e.htm)  
<http://www.ec.gc.ca/default.asp?lang=En&n=FD9B0E51-1>
- **Indian and Northern Affairs Canada, Northern Contaminants Program**  
[www.inac-ainc.gc.ca/ncp/index\\_e.html](http://www.inac-ainc.gc.ca/ncp/index_e.html)
- **Arctic Borderlands Ecological Knowledge Society**  
[www.taiga.net](http://www.taiga.net)
- **Government of Yukon, Environment**  
<http://www.environmentyukon.gov.yk.ca/monitoringenvironment/>

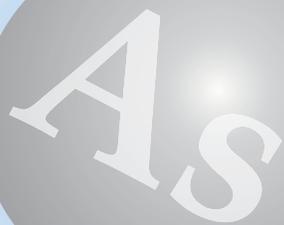
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- Department of Indian and Northern Affairs. (1997). *Canadian Arctic Contaminants Assessment Report*: Jensen, J., Adare, K., Shearer, R. (Eds.).
- Nicholson, H.C. 2002. Arsenic in *Plants Important to Two Yukon First Nations: Impacts of Gold Mining and Reclamation Practices*. Msc Thesis, University of British Columbia, 2002. 102pp.
- Gamberg, M. (2008). *Arctic Caribou and Moose Contaminant Monitoring Program. Synopsis of Research*, Northern Contaminants Program 2007-2008. pp.108-113. Department of Indian and Northern Affairs, Northern Contaminants Program, Ottawa, ON.

The Yukon Contaminants Committee co-ordinates the Northern Contaminants Program for the territory. Its members represent Canada, Yukon and the Council of Yukon First Nations, Yukon Conservation Society, and Yukon College.

Since its establishment in 1991, the Committee has acted as a link between the scientific community and Northerners on contaminants issues. Please direct any comments to the Yukon Contaminants Committee (867) 667-3283 or toll-free 1 (800) 661-0451 ext. 3283

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