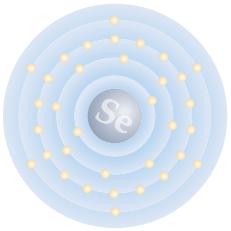
Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada



Metals of Concern Fact Sheet Series

Selenium

Highlights

- Selenium is found naturally in the earth's crust.
- Selenium is used mostly in electronic and photocopier components.
- Although selenium is thought to mitigate the toxic action of mercury, high concentrations of selenium have negative health effects.
- As an antioxidant, selenium helps to prevent damage caused by oxygen to the body's tissues.
- Foods that contain selenium include broccoli, onions and whole wheat.
- Selenium is not found in any Yukon country foods at levels of concern.

What is selenium?

Selenium is widely but unevenly distributed in the earth's crust. It is most often associated with copper ores but may also be found with silver, lead and zinc ores. Organic compounds of selenium may form in plants, fish and animals.

Selenium is used in electronics and photocopiers due to its semiconductive and photoelectric properties. Glass, pigments, rubber, metal alloys, textiles, plastics, photographic emulsions, nutritional supplements, antidandruff shampoo, sheep and cattle feed additives, medical therapeutic agents and petroleum are products that may contain selenium. Broccoli, onions, whole wheat, tomatoes, tuna, bran and wheat germ are natural whole foods containing selenium.

How does selenium enter the environment?

Selenium can be released into the soil through leaching and weathering of bedrock. In the Yukon, the shale rock in the Selwyn area is high in selenium, and some lakes that sit in this host-rock have higher levels of natural selenium. Ground and surface water can transport selenium through the environment. Plants can absorb water-soluble selenium compounds from the soil and groundwater and transform them into organic compounds. Milk-vetch is a flowering plant in the Yukon that thrives in high selenium soils; selenium accumulates in animals that forage on the plant.

Some selenium may also be released to the environment by human activity, primarily coal combustion, metal ore refinement (particularly copper), and leaching from waste containers.

Is selenium toxic?

At low levels, selenium is an essential element in the diet. It acts as an antioxidant in the body, helping to prevent damage to tissues by oxygen. Both inorganic (from minerals) and organic (from plants) selenium can be metabolized; however, organic selenium is metabolized more efficiently than inorganic selenium. Selenium can be flushed out of the body to a limited extent through urine, feces and breath.

Because selenium is a micronutrient, a deficiency in the diet may have harmful effects. The reverse is also true: if you ingest, inhale or absorb too much selenium, it can have negative health effects. Short-term low-dose exposure may result in hair loss, muscle discomfort, skin rashes, swelling, nausea and fatigue. Higher short-term doses can lead to fingernail loss, changes in the nervous and circulatory systems and/or possible damage to the liver and kidneys. Long-term chronic high doses of selenium can trigger the build-up of fluid in the lungs and lead to severe bronchitis.

High levels of selenium are known to be toxic to animals; this has been a problem in the Western United States and Canada. Moose in the Yukon have levels of selenium in their organs that would be considered toxic in cattle; this may indicate that moose have adapted to these higher levels. However, selenium levels of concern to humans have not been found in Yukon country foods, including moose.

Selenium is thought to have mitigating effects on the toxic action of mercury, so

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mercury monitoring of Yukon foods has been combined with studies about selenium levels.

Where to find more information on the web:

- **Health Canada**
  http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/selenium/index-eng.php
  http://www.hc-sc.gc.ca/ewh-semt/contaminants/index-eng.php

- **Environment Canada**
  http://www.chemicalsubstanceschimiques.gc.ca/index-eng.php
  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

- **Arctic Borderlands Ecological Knowledge Society**
  www.taiga.net

- **Government of Yukon, Environment**
  http://www.environmentyukon.gov.yk.ca/monitoringenvironment/

References:

- Department of Indian and Northern Affairs. (1997). *Canadian Arctic Contaminants Assessment Report*: Jensen, J., Adare, K., Shearer, R. (Eds.)
- Lemly, D.A. and G.J. Smith (1987). "Aquatic cycling of selenium: implications for fish and wildlife". U.S. Dept. of the Interior, Fish and Wildlife Service, Leaflet 12. Washington, D.C. 1987.

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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