



SELENIUM

FACT SHEET ON A DRINKING WATER CHEMICAL CONTAMINANT

GENERAL INFORMATION

Synonyms:

- None

Chemical Description:

- Naturally occurring inorganic chemical (metal) found in abundance in combined form in rocks and soils around the world, usually with sulfide-type ores of heavy metals

Properties:

- Solubility of selenium compounds is chemical-specific

Production and Use:

- Used in electronics, photocopy components, the manufacture of glass, chemicals, drugs, and as a fungicide and feed additive

ENVIRONMENTAL PROFILE

Occurrence:

- Occurs naturally as a low level contaminant of drinking water as a result of weathering of soils and rocks, and as a by-product of copper mining and smelting
- Present in coal and fuel oil
- Present in food

Releases:

- Released to the environment primarily from coal combustion, copper mining and smelting, and industrial wastes

Environmental Fate:

- In alkaline soils and oxidizing conditions, it may be oxidized sufficiently to maintain the availability of its biologically active form, and cause plant uptake of the metal to be increased
- In acidic or neutral soils, it tends to remain relatively insoluble and the amount of biologically available selenium should steadily decline

HEALTH EFFECTS

Humans:

- An essential nutrient at low levels (inadequate dosage results in Keshan disease)
- Short-term toxic effects of high-dose exposure include hair and fingernail changes, damage to the peripheral nervous system, fatigue, and irritability
- Long-term toxic effects of high-dose exposure include hair and fingernail loss, and damage to the kidney, liver, and nervous and circulatory systems

Experimental Animals:

- Long-term, high-dose exposures cause damage to the kidney, liver, and nervous and circulatory systems
- Little evidence of mutagenic or carcinogenic potential

REGULATORY PROFILE

Existing Standards:

- **Clean Air Act (CAA):** Not regulated
- **Clean Water Act (CWA):**
Criteria established
- **Resource Conservation and Recovery Act (RCRA):**
Not regulated
- **Superfund (CERCLA):**
 - Hazardous waste
 - **SARA:** Toxic waste
- **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA):**
Registered
- **Toxic Substances Control Act (TSCA):**
Regulated

HEALTH INFORMATION

Maximum Contaminant Level Goals (MCLG):

- Non-enforceable levels based solely on an evaluation of possible health risks and exposure, and taking into consideration a margin for public safety
- Set at 0.05 mg/L to protect against damage to the nervous system

MCLG for Selenium = 0.05 mg/L
(effective July 1992)

Maximum Contaminant Levels (MCL):

- Legally enforceable levels for contaminants in public drinking water supplies
- Based on health risks associated with the contaminants, analytical methods for their assay, and water treatment feasibility and practicality aspects
- Exceedance of the MCL in drinking water may result in adverse effects which will depend upon the contaminant concentration in water, amount of water/contaminant ingested, length of exposure, and other biological parameters
- Current MCL = 0.01 mg/L

MCL for Selenium = 0.05 mg/L
(effective July 1992)

EPA Health Advisories (HA):

- **Short-term HAs:** Provide acceptable concentrations of contaminants in water for up to 10 day exposures, primarily to evaluate the public health risk resulting from an accidental spill or an emergency contamination situation
- **Longer-term HAs:** Provide guidance for persistent water contamination situations to cover a period of up to 7 years
- **Lifetime HAs:** Derived in the same way as an MCLG

Health Advisories:

A Health Advisory does not exist at this time

ANALYTICAL METHODS

- Gaseous Hydride Atomic Absorption
EPA Method 270.3
- Graphite Furnace Atomic Absorption
EPA Method 270.2

WATER TREATMENT

Permanent Treatment:

- **Best Available Technology (BAT):**
 - Electrodialysis Reversal
 - Coagulation/Filtration
 - Activated Alumina
 - Lime Softening
 - Reverse Osmosis

SHORT-TERM HAZARD ELIMINATION

- If the drinking water standards are exceeded, install BAT or use an alternative drinking water supply such as bottled water

ADDITIONAL HELP

- State or county health officials can indicate a certified laboratory for testing
- Experts in the state Department of Environmental Protection or Natural Resources may also be of help
- The EPA has toll-free numbers for further information on drinking water quality, treatment technologies, for obtaining Health Advisories, and for other regulatory information
- EPA Hotlines are available Monday through Friday
 - **Safe Drinking Water:** 800-426-4791
 - **National Pesticides:** 800-858-7378
 - **Superfund/RCRA:** 800-424-9346
- For information on the Clean Water Act, call (202) 260-7301
- For information on the Toxic Substances Control Act, call (202) 554-1404
- For information on the Clean Air Act, call (919) 541-2777