



# CADMIUM

## FACT SHEET ON A DRINKING WATER CHEMICAL CONTAMINANT

### GENERAL INFORMATION

#### Synonyms

- None

#### Chemical Description:

- Naturally occurring element (transition metal) found in most rock, coal, and lead or zinc ores as various salts

#### Properties:

- Elemental form is insoluble in water
- Solubility of cadmium salts is compound specific

#### Production and Use:

- Commercially obtained as a byproduct during the processing of zinc-bearing ores
- Used in the manufacturing of batteries, stabilizers, pigments, metal alloys, and electroplating for corrosion resistance

### ENVIRONMENTAL PROFILE

#### Occurrence:

- Naturally occurring in water supplies from erosion of mineral deposits at levels in the range of 0.001-0.01 mg/L
- Naturally occurring in soil, and as a consequence, in food
- Occurs as a byproduct of corrosion of some galvanized plumbing and distribution system materials

#### Releases:

- Enters the environment primarily through industrial effluents and landfill leaching
- Can enter surface waters from natural sources and from a variety of manufacturing operations that involve cadmium or zinc that contains a cadmium impurity

#### Environmental Fate:

- Highly persistent in water
- High potential for bioaccumulation, especially fish and other aquatic organisms
- Persistent in many tissues such as muscles, kidneys, and liver

### HEALTH EFFECTS

#### Humans:

- Symptoms of acute oral toxicity include nausea, vomiting, diarrhea, muscular cramps, salivation, sensory disturbances, liver injury, convulsions, shock, and/or renal failure and cardiopulmonary depression
- Long-term oral exposure to high levels of cadmium may result in damage to the kidneys, liver, bones, and blood

#### Experimental Animals:

- Short-term, high-dose oral exposures to various cadmium compounds resulted in damage to the nervous system, kidney, liver, bone, blood formation system, cardiovascular system
- Long-term, high-dose exposures by drinking water had adverse effects upon functions of the liver and kidneys
- High oral doses of cadmium had detrimental reproductive and teratogenic effects on rats
- Equivocal evidence of mutagenic potential
- Carcinogenic via inhalation, but limited evidence of carcinogenicity following chronic oral exposure

### REGULATORY HISTORY

#### 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 substance
- **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA):**  
Registered (Cadmium compounds)
- **Toxic Substances Control Act (TSCA):**  
Not 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 0.005 mg/L to protect against kidney and liver damage

**MCLG for Cadmium = 0.005 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 Cadmium = 0.005 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:

**Short-term HA for a child = 0.04 mg/L  
Longer-term HA for a child = 0.005 mg/L  
Longer-term HA for an adult = 0.02 mg/L  
Lifetime HA = 0.005 mg/L**

## ANALYTICAL METHODS

- Graphite Furnace Atomic Absorption  
EPA Method 213.2
- Inductively Coupled Plasma  
EPA Method 200.7A

## WATER TREATMENT

### Permanent Treatment:

#### **Best Available Technology (BAT):**

- Coagulation/Filtration
- Lime Softening
- Reverse Osmosis
- Ion Exchange

## 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