CHLORDANE

FACT SHEET ON A DRINKING WATER CHEMICAL CONTAMINANT

GENERAL INFORMATION

Synonyms:
- Trade names: Belt; Chlor-Kil; Chlorotox; Corodane; Dowclor; Gold Crest C-100; Kilex; Kypchlor; Niran; Octachlor; Octa-Klor; Synklor; Termi-Ded; Topiclor 20; Toxichlor; Velsicol 1068

Chemical Description:
- Insecticide belonging to the group of chlorinated hydrocarbons known as cyclodiene insecticides

Properties:
- Viscous amber liquid with a chlorine odor
- Consists of a mixture of 60-75% chlordane isomers (mainly cis- and trans-), and 25-40% of 24 other organochlorine compounds, including heptachlor
- Insoluble in water
- Low vapor pressure
- Heavier than water

Production and Use:
- Insecticide used for termite control; most widely used insecticide in the U.S. for control of subterranean termites
- Prior to its suspension and cancellation of all agricultural uses by EPA in 1980, it was widely used as an insecticide to control various worms, termites, and other pests on a variety of food crops

ENVIRONMENTAL PROFILE

Occurrence:
- Results of the EPA's 1990 National Pesticide Survey (NPS) indicate that chlordane was not present above the MCL of 0.002 mg/L in any rural domestic wells or in any Community Water System (CWS) wells nationwide
- There have been reports of individual household wells becoming contaminated after a house has been sprayed with chlordane for termite control
- Has been detected in rainwater
- Some States have prohibited the use of chlordane (and other chlorinated hydrocarbons) for termite control

Releases:
- Because chlordane is applied by subsurface injection, the potential for migration and contamination of ground water is high
- May enter ground water from direct entry into a well through accidental chemical spills or improper storage near a well

Environmental Fate:
- **Extremely persistent in the environment:**
  - **In soils:** highly resistant to chemical and biological degradation (residues may persist in soils for 14 years); generally immobile (binds to soils) with a moderate potential for migration to ground water ; volatilization is an important removal process on soil
  - **In surface waters:** resistant to hydrolysis and biodegradation; volatilization, and adsorbtion to suspended sediment and bottom sediment are likely to be the major removal mechanisms; may photochemically degrade in water and on plant surfaces to photo-cis-chlordane (found to be twice as toxic as chlordane to fish and mammals); expected to be highly persistent in ground waters due to very low volatilization rates
- High potential for bioaccumulation

HEALTH EFFECTS

Humans:
- In clinical case studies of acute and chronic exposure to chlordane (ingestion, inhalation, or dermal contact), the most common effects are central nervous system (CNS) effects and blood dyscrasias (blood system malfunctions)
  - CNS effects include irritability, excess salivation, labored breathing, tremors, convulsions, deep depression, and death
  - blood system effects generally include anemia and various types of leukemia
- Absorbed through skin to produce toxic effects
  - spray operators, farmers, and chlordane formulators may be exposed

Experimental Animals:
- Acute intoxication principally causes a wide range of detrimental CNS effects, including irritability, tremors, and convulsions alternating with lethargy, diarrhea, and food refusal
- Long-term, high-dose studies indicate that chronic exposure damages functions of the liver, as well as the kidneys, heart, lungs, spleen, and adrenal glands; chlordane may also be a cumulative neurotoxin

- Caused significant reduction in fertility of female mice
- No fetotoxic or teratogenic effects observed
- Equivocal evidence of mutagenic potential
- High carcinogenic potential

REGULATORY PROFILE

Existing Standards:

- **Clean Air Act (CAA):** Not regulated
- **Clean Water Act (CWA):**
  Criteria established
- **Resource Conservation and Recovery Act (RCRA):**
  Hazardous waste
- **Superfund (CERCLA):**
  - Hazardous substance
  - **SARA:** Toxic chemical
- **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA):**
  Registered
- **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 zero mg/L to protect against cancer

MCLG for Chlordane = Zero 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

MCL for Chlordane = 0.002 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 = 0.06 mg/L
Longer-term HA for a child = 0.003 mg/L
Longer-term HA for an adult = 0.003 mg/L
Lifetime HA = Not recommended

ANALYTICAL METHODS

- Microextraction and Gas Chromatography
  EPA Method 505
- Gas Chromatography with an Electron Capture Detector
  EPA Method 508
- Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry
  EPA Method 525

WATER TREATMENT

Permanent Treatment:

- **Best Available Technology (BAT):**
  - Granular Activated Carbon

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, Natural Resources, or Agriculture 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