



LINDANE

FACT SHEET ON A DRINKING WATER CHEMICAL CONTAMINANT

GENERAL INFORMATION

Synonyms:

- Gamma-hexachlorocyclohexane; Gamma HCH; Gamma-benzene hexachloride
- Trade names: Forlin; Gammaphex; Gammex; Isotox; Lacco; Kwell; Lindagam; Lin-O-Sol; Novigam; Silvanol; Exagamma; Lintox, etc.
- Component of: Agrox-3-Way; Gammatin; Isopro; Granol NM, etc.

Chemical Description:

- Insecticide which is a member of the chemical family of chlorinated hydrocarbons

Properties:

- Colorless crystalline solid with a musty odor
- Slightly soluble in water
- Low vapor pressure

Production and Use:

- Most uses were restricted in 1983, and is currently used primarily for treating wood inhabiting beetles and seeds
- Also used for soil treatment, foliage application on fruit and nut trees, vegetables, timber, ornamentals, and wood protection

ENVIRONMENTAL PROFILE

Occurrence:

- Monitoring surveys of public water supplies have reported lindane levels ranging from "non-detected" to 0.002 mg/L; actual levels in public water supplies are generally much lower due to rapid volatilization from surface waters and soil
- Results of the EPA's 1990 National Pesticide Survey (NPS) indicate that lindane is present in rural domestic wells nationwide above the MCL of 0.0002 mg/L, but was not detected in any Community Water System (CWS) wells
- May be a common contaminant in areas of high usage

Releases:

- Enters surface water as a result of runoff from agricultural land and from home/garden applications

- May enter ground water from direct entry into a well through accidental chemical spills or improper storage near a well

Environmental Fate:

- **Persistent in both soil and water:**
 - may volatilize from shallow, turbulent surface waters, but not from deep or stagnant surface waters or ground water
 - not likely to biodegrade nor hydrolyze in most surface waters
 - low mobility in soil and moderately resistant to leaching from soils; low potential to migrate to ground water
 - primarily removed from soil by volatilization; will volatilize from the soil surface and at shallow depths, but is not likely to volatilize at deeper depths
- Moderate potential for bioaccumulation

HEALTH EFFECTS

Humans:

- Case reports of excessive dermal or oral intake indicate that the acute effects include alterations in the nervous system:
 - may produce vomiting, faintness, tremors, restlessness, muscle spasms, unsteady gait, seizures, and uncontrollable eye movements; coma, respiratory failure, and death may result
 - elevated body temperature and pulmonary edema have been reported in children
- Inhibits protein, DNA, and RNA synthesis in white blood cells

Experimental Animals:

- High acute toxicity due to its extremely rapid rate of absorption, causing symptoms of toxicity to manifest shortly after exposure
- Short-term, high-dose studies indicate detrimental effects upon the nervous system such as loss of coordination and delayed conduction velocities in nerves; also causes immunosuppressive effects
- Long-term, high-dose studies indicated damage to the liver and kidneys
- Equivocal evidence of mutagenic potential
- No evidence of fetotoxic, teratogenic, or carcinogenic potential

REGULATORY PROFILE

Existing Standards:

- **Clean Air Act (CAA):** Not regulated
- **Clean Water Act (CWA):**
No 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 0.0002 mg/L to protect against damage to the liver, kidneys, and nervous system

MCLG for Lindane = 0.0002 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 = 0.004 mg/L

MCL for Lindane = 0.0002 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 = 1 mg/L
Longer-term HA for a child = 0.03 mg/L
Longer-term HA for an adult = 0.1 mg/L
Lifetime HA = 0.0002 mg/L

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