Technical Factsheet on: LINDANE

List of Contaminants

As part of the Drinking Water and Health pages, this fact sheet is part of a larger publication:
National Primary Drinking Water Regulations

Drinking Water Standards
MCLG: 0.0002 mg/L
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HAL(child): 1 to 10 day: 1 mg/L; Longer term: 0.03 mg/L

Health Effects Summary

Acute: EPA has found lindane to potentially cause nervous system effects from short-term exposures at levels above the MCL. High body temperature and pulmonary edema have been reported in children with acute exposures.

Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg (22 lb.) child consuming 1 liter of water per day, a one- to ten-day exposure to 1 mg/L or a longer term exposure to 0.03 mg/L.

Chronic: Lindane has the potential to cause liver and kidney damage from long-term exposure at levels above the MCL.

Cancer: There is inadequate evidence to state whether or not lindane has the potential to cause cancer from lifetime exposures in drinking water.

Usage Patterns

Most uses being restricted in 1983, lindane is currently used primarily for treating wood-inhabiting beetles and seeds. It is also used as a dip for livestock, for soil treatment, on the foliage of fruit and nut trees, vegetables, timber, ornamentals and for wood protection.

Release Patterns

Lindane enters surface water as a result of runoff from agricultural land and from home and garden applications where it is used as an insecticide.

Data from the early 1980's reported mean loadings in treated wastewater in kg/day as follows: coal mining - 0.0081, foundries - 0.02 and nonferrous metals manufacturing - 0.0004.

From 1987 to 1993, according to EPA's Toxics Release Inventory, lindane releases to land and water totalled 1115 lbs.

Environmental Fate

When released to water, lindane is not expected to volatilize significantly. The volatilization half-life of lindane from water at a depth of 1 meter was estimated to be 115 to 191 days. However, experimental volatilization half-life of lindane in very shallow, turbulent waters was 1.5 days.

It is not expected to biodegrade or hydrolyze in most surface waters. Lindane released to acidic or neutral water is not expected to hydrolyze significantly, but in basic water, significant hydrolysis may occur.

Transport to the sediment should be slow and result predominantly from diffusion rather than settling. Lindane may slowly biodegrade in aerobic media and will rapidly degrade under anaerobic conditions. Lindane has been reported to photodegrade in water in spite of the lack of a photoreactive center, but photolysis is not considered to be a major environmental fate process.

Release of lindane to soil will most likely result in volatilization from the soil surface, but not from greater depths. A mean Koc of 1080.9 was obtained from Koc determinations on three soils(1). The average organic carbon content of the soils used was 13%(1). Based on this moderate Koc value and a water solubility of 17 ppm(2), lindane is expected to leach slowly to groundwater.

Lindane in the atmosphere is likely to be subject to rain-out and dry deposition. The estimated half-life for the reaction of vapor phase lindane with atmospheric hydroxyl radicals is 1.63 days. Lindane will bioconcentrate slightly in fish. Bioconcentration factors of 16 to 1600 are reported for a variety of molluscs, crustaceans and fish.

Chemical/ Physical Properties

CAS Number: 58-89-9

Color/ Form/Odor: White crystalline solid

M.P.: 112.5 C B.P.: 323.4 C

Vapor Pressure: 9.4x10-6 mm Hg @ 25 C

Density/Spec. Grav.: 1.85

Octanol/Water Partition (Kow): Log Kow = 3.72 to 3.61

Solubility: 7.3 mg/L of water at 25 C; Slightly soluble in water

Soil sorption coefficient: average Koc = 1081; low soil mobility

Odor/Taste Thresholds: N/A

Bioconcentration Factor: 319 to 1613 reported in fish; some potential to bioaccumulate.

Henry's Law Coefficient: N/A

Trade Names/Synonyms: Benzene hexachloride-gamma, gamma-Hexachlorocyclohexane, Exagamma, Forlin, Gallogamma, Gammaphex, Inexit, Kwell, Lindagranox, Lindaterra, Lovigram, Silvanol

Other Regulatory Information

Monitoring For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples every 3 years
Repeat Frequency- If no detections during initial round:
2 quarterly per year if serving >3300 persons;

1 sample per 3 years for smaller systems
Triggers - Return to Initial Freq. if detect at > 0.00002 mg/L

Analysis:

Reference Source	Method Numbers
EPA 600/4-88-039	505; 508; 508.1; 525.2

Treatment- Best Available Technologies:
Granular Activated Charcoal

For Additional Information:

EPA can provide further regulatory and other general information:
EPA Safe Drinking Water Hotline - 800/426-4791

Other sources of toxicological and environmental fate data include:
Toxic Substance Control Act Information Line - 202/554-1404
Toxics Release Inventory, National Library of Medicine - 301/496-6531
Agency for Toxic Substances and Disease Registry - 404/639-6000
National Pesticide Hotline - 800/858-7378