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# Purchasing for Pollution Prevention

## What's Wrong With Lindane?

- Lindane (gamma hexachlorocyclohexane) is a chemical compound used in some prescription treatments for head lice and scabies (as well as some dog dips for mange). Lindane is a persistent chemical that can build up (bioaccumulate) in aquatic animals.
- Overuse of lindane can seriously affect the nervous system, causing seizures or convulsions.<sup>1</sup>
- When poured down the drain, one dose of lindane used to control lice or scabies can pollute millions of gallons of water to levels exceeding EPA's water quality standards.<sup>2</sup>
- Sewage treatment facility operators in California determined that lindane lotions and shampoos were the primary source of excess lindane loads being discharged into surface water. (As a result, California banned the use of lindane to treat lice and scabies.)<sup>3</sup>
- Lindane treatments for lice and scabies can pose higher risks to patients and the environment than other treatments.

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### Is lindane appropriate for the treatment of head lice?

Studies indicate that less toxic and less environmentally damaging treatment alternatives perform with equal or greater efficacy.<sup>4</sup> Yet lindane is still prescribed frequently as a treatment for head lice and scabies in the United States – including in many public institutions.

### What are the human health risks associated with lindane?

- Lindane can damage the human nervous system. Overexposure is linked to seizures, convulsions, and other nervous system problems. Acute overexposure to lindane can lead to death.<sup>5</sup>
- Workers exposed to this insecticide at manufacturing plants experienced lung irritation, heart and blood disorders, headaches, convulsions, and changes in reproductive hormones.<sup>6</sup>
- The US National Toxicology Program categorizes lindane as “reasonably anticipated to be a human carcinogen,”<sup>7</sup> and the International Agency for Research on Cancer lists it as a possible human carcinogen.<sup>8</sup>
- The Hazardous Substances Database of the National Library of Medicine lists numerous peer-reviewed reports of lindane poisoning episodes resulting in agitation, seizures, convulsions, and even death. In sev-

eral cases, overexposure resulted from the overuse of lindane remedies for head lice.<sup>9</sup>

- Misuse of lindane is common in the home. The Washington State Department of Health reported that, from 1991 to 1999, 25 children swallowed lindane left within their reach and nine people gave lindane to themselves or their children by accident.<sup>10</sup>
- Nursing women exposed to lindane can feed it to their babies in their breast milk.<sup>11</sup>

### How do the risks of lindane exposure compare with the risks of other treatments?

- A 1996 study found that human skin is 20 times more permeable to lindane than to permethrin, an alternative lice and scabies treatment. It concluded that “[t]he risk for toxic effects...is projected to be 40 to 400 times lower for 5% permethrin cream than for 1% lindane lotion.”<sup>12</sup>
- Lindane has been shown in animal studies to affect the endocrine system.<sup>13</sup>

### What environmental risks are associated with lindane?

- The Los Angeles County Sanitation District (LACSD) estimates that one 2-ounce dose of lindane can pollute

6 million gallons of water, the equivalent of 300 swimming pools.<sup>14</sup> Because lindane use in the US is extremely restricted, LACSD has concluded that “the main source of lindane in sewers is the treatment of head lice and the skin mite scabies.”<sup>15</sup>

- Lindane is “highly to very highly toxic” to fish and bees, and is moderately toxic to birds.<sup>16</sup>
- EPA considers lindane a pollutant of concern in the Great Lakes due to its persistence in the environment, potential to bioaccumulate, and toxicity to humans and the environment.<sup>17</sup>
- Lindane was detected in 6% of the surface water bodies tested by the US Geological Survey in its National Reconnaissance Study.<sup>18</sup> It has also been detected at unsafe levels in individual water bodies. For example, concentrations sufficient to produce

negative ecosystem effects have been found in the Lake Erie basin.<sup>19</sup> Lindane levels exceeding water quality standards have also been found in freshwater bodies in Ohio.<sup>20</sup>

- Lindane is highly persistent in soils and in water, and can build up in plants with high lipid content.<sup>21</sup> This insecticide also can migrate from soils to groundwater, as it has been found at low levels in groundwater samples from across the US.<sup>22</sup>

*For lindane-free management practices that facilities may employ, with or without the use of chemical controls, to successfully prevent or treat head lice or scabies infestations, see INFORM’s fact sheets “[Lindane-Free Head Lice Prevention and Treatment](#)” and “[Lindane-Free Scabies Prevention and Treatment](#).”*

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## Notes

<sup>1</sup> US Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Alpha-, Beta-, Gamma-, and Delta-Hexachlorocyclohexane," 1999, <http://www.atsdr.cdc.gov/tox-profiles/tp43.html>.

<sup>2</sup> This statistic is based on the maximum contaminant level set for lindane at 0.2 parts per billion under the Safe Drinking Water Act of 1974. See Sanitation District of Los Angeles County, "L.I.C.E. – Lindane Isn't Cool for the Environment," <http://www.lacsd.org/lindane>.

<sup>3</sup> State of California, "AB 2318 – Chaptered Bill Text," [http://www.leginfo.ca.gov/pub/99-00/bill/asm/ab\\_2301-2350/ab\\_2318\\_bill\\_20000907\\_chaptered.html](http://www.leginfo.ca.gov/pub/99-00/bill/asm/ab_2301-2350/ab_2318_bill_20000907_chaptered.html), 2000.

<sup>4</sup> Jones, Kimberly N., and Joseph C. English III, "Review of Common Therapeutic Options in the United States for the Treatment of Pediculosis Capitis," *Clinical Infectious Diseases*, 2003, Volume 36, 1355-1359; Vander Stichele, Robert H., et al., "Systematic Review of Clinical Efficacy of Topical Treatments for Head Lice," *British Medical Journal*, 1995, Volume 311, 604-608, <http://bmj.com/search.dtl>; Wendel, Karen, and Anne Rompalo, "Scabies and Pediculosis Pubis: An Update of Treatment Regimens and General Review," *Clinical Infectious Diseases*, 2002, Volume 24, Supplement 2, 5146-5151.

<sup>5</sup> US Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Alpha-, Beta-, Gamma-, and Delta-Hexachlorocyclohexane," 1999, <http://www.atsdr.cdc.gov/tox-profiles/tp43.html>.

<sup>6</sup> US Environmental Protection Agency, "Gamma-hexachlorocyclohexane," fact sheet, [www.epa.gov/epaoswer/hazwaste/minimize/hexagama.pdf](http://www.epa.gov/epaoswer/hazwaste/minimize/hexagama.pdf).

<sup>7</sup> US Department of Health and Human Services, National Toxicology Program, "Lindane and Other Hexachlorocyclohexane Isomers," revised January 2002, <http://ehis.niehs.nih.gov/roc/ninth/rohclindane.pdf>.

<sup>8</sup> International Agency for Research on Cancer, "Overall Evaluations of Carcinogenicity to Humans," <http://monographs.iarc.fr/monoeval/crthall.html>.

<sup>9</sup> National Institutes of Health, National Library of Medicine, Hazardous Substances Database.

<sup>10</sup> Washington State Department of Health, Office of Environmental Health and Safety Pesticide Program, "Lindane," fact sheet, February 2001, <http://www.doh.wa.gov/ehp/ts/Pest/Lindane-factsheet.pdf>.

<sup>11</sup> US Environmental Protection Agency, "Gamma-hexachlorocyclohexane," fact sheet, [www.epa.gov/epaoswer/hazwaste/minimize/hexagama.pdf](http://www.epa.gov/epaoswer/hazwaste/minimize/hexagama.pdf).

<sup>12</sup> Franz, T.J., et al., "Comparative Percutaneous Absorption of Lindane and Permethrin," *Archives of Dermatology*, 1996, Volume 132, Number 8, 901-905.

<sup>13</sup> US Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Alpha-, Beta-, Gamma-, and Delta-Hexachlorocyclohexane," 1999, <http://www.atsdr.cdc.gov/tox-profiles/tp43.html>.

<sup>14</sup> This statistic is based on the maximum contaminant level set for lindane at 0.2 parts per billion under the Safe Drinking Water Act of 1974. Sanitation District of Los Angeles County, "L.I.C.E. – Lindane Isn't Cool for the Environment," <http://www.lacsd.org/lindane>.

- <sup>15</sup> Los Angeles County Sanitation District, "Lindane Reduction Project Underway," <http://www.lacsd.org/iw/news.htm>.
- <sup>16</sup> National Pesticide Information Network, Pesticide Information Profiles, "Lindane," <http://ace.orst.edu/info/extoxnet/pips/lindane.htm>, June 1996.
- <sup>17</sup> US EPA, Technology Transfer Network Air Toxics Website, "Lindane (Gamma-Hexachlorocyclohexane)," <http://www.epa.gov/ttn/atw/hlthef/lindane.html>.
- <sup>18</sup> U.S. Geological Survey, "Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in U.S. Streams, 1999-2000: A National Reconnaissance," *Environmental Science & Technology*, Volume 36, Number 6, 1202-1211, [http://toxics.usgs.gov/regional/emc\\_surfacewater.html](http://toxics.usgs.gov/regional/emc_surfacewater.html).
- <sup>19</sup> US EPA Region 5 and Environment Canada, *Lake Erie Lakewide Management Plan (LaMP) 2000*, <http://www.epa.gov/glnpo/lakeerie/lamp2000/>.
- <sup>20</sup> US EPA Region 5, *Pollutant Load Analysis to Assess Sources of Sediment and Water Column Toxicity in Little Beaver Creek, Ohio* (draft final report), March 2000, <http://www.epa.state.oh.us/dsw/tmdl/ULMRAppF.pdf>.
- <sup>21</sup> International Programme On Chemical Safety, Environmental Health Criteria 124, *Lindane*, 1991, <http://www.inchem.org/documents/ehc/ehc/ehc124.htm>.
- <sup>22</sup> Extension Toxicology Network Pesticide Information Profiles, "Lindane," revised July 1996, <http://ace.orst.edu/cgi-bin/mfs/01/pips/lindane.htm>.

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