

## Format for submitting pursuant to Article 8 of the Stockholm Convention the information specified in Annex E of the Convention

Introductory information	
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Chemical name (as used by the POPS Review Committee (POPRC))	CAS: gamma, 1,2,3,4,5,6-hexachlorocyclohexane Synonyms/abbreviations: gamma benzene hexachloride; gamma-BHC; Lindane
Date of submission	13.01.2006

(a) Sources, including as appropriate (provide summary information and relevant references)	
(i) Production data:	<a href="#"><sup>2</sup>1964-1977, OHIS chemical industry, Skopje, Republic of Macedonia</a>
Quantity	<a href="#"><sup>1</sup>up to 30,000 t</a> <a href="#"><sup>2</sup>200 t/y product gamma lindane + 1800 t/y waste of ALFA, Beta, Delta Lindane</a>
Location	Skopje, R. of Macedonia, OHIS Plant
Other	
(ii) Uses	<a href="#"><sup>1</sup>formulation of insecticide 'Lindane'</a> , <a href="#"><sup>2</sup>Insecticide Lindane, licence Boehringer Germany</a> <a href="#"><sup>3</sup>Insecticide, sparying of seeds, shampoos against lice and scabies</a>
(iii) Releases:	
Discharges	<a href="#"><sup>1</sup>alpha, beta, gamma and delta - BHC solid waste stored in a 'temporary' site for over 30 years</a> <a href="#"><sup>2</sup>Waste 25-30 000 t Alfa + Beta Isomers</a>
Losses	<a href="#"><sup>1</sup>Leaching by the rainfalls and leakage of the leachates through the colapsed or erroded concrete pool's bottom used for BHC discharge</a> <a href="#"><sup>2</sup>Waste 3000 t Delta isomer</a>
Emissions	<a href="#"><sup>1</sup>Underground water and then in the nearby Vardar River: soil</a>

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<b>Other</b>	<p><sup>3</sup><a href="#">Contamination of soil and ground water ,Contamination of food, meet and fish , Absorption through the skin, accidental ingestion by children</a></p>
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<b>(b) Hazard assessment for endpoints of concern, including consideration of toxicological interactions involving multiple chemicals (provide summary information and relevant references)</b>	
<p><sup>1</sup><a href="#">Lindane and alpha hexachlorocyclohexane have made up about 75 per cent of the organochlorine compounds measured in snowpack in the Canadian Arctic. The most common human exposure pathway to Lindane is through food. A direct correlation exists between food intake, especially fish, meat and dairy products, and marine mammals, and lindane concentrations in body fat and human milk</a></p> <p><sup>2</sup><a href="#">Lindane is reported to be highly toxic to some fish and other aquatic species. Due to its physico-chemical properties it has the potential to be transported at long distances. It is ecotoxic and has acute and chronic adverse effects in humans. It can be assumed that the soil under the dumpsites is contaminated with HCH. The soil moisture contains 10-50 µg/kg dissolved HCl to 3 m dept. This contamination drains into the ground water aquifer down stream of the dumpsites (concentration of 1017 µg/l HCH)</a></p> <p><sup>3</sup><a href="#">Toxic especially for children who have large body surface as an absorption field. Used on the skin against scabies, and on the head against lice. Sometimes whole rooms sprayed against lice. Absorbed from the air through respiration in the vicinity of factories. Ingested through contaminated vegetables, meet or water. Also, through breastfeeding. There is evidence of antiandriogenic effects (cryptorchidism, atrophy of the testes, lower androgen levels in the blood), estrogenic effects(breast carcinoma). Malformation in newborn could also be caused by exposure to lindane.</a></p>	

<b>(c) Environmental fate (provide summary information and relevant references)</b>	
<b>Chemical/physical properties</b>	<sup>2</sup> <a href="#">Lindane, Alfa, Beta and Delta isomers</a>
<b>Persistence</b>	<sup>1</sup> <a href="#">Lindane has a half-life of 2.3 to 13 days in air, 30 to 300 days in water, 50 days in sediments and two years in soil. It is stable to light, high temperatures and acid but it can be hydrolyzed at high pH. Lindane degrades very slowly by microbial action. Lindane is more water-soluble and volatile than other chlorinated organic chemicals, which explains why it is found in all environmental media (water/snow, air, soil/sediments).</a>
<b>How are chemical/physical properties and persistence linked to environmental transport, transfer within and between environmental compartments, degradation and transformation to other chemicals?</b>	<sup>2</sup> <a href="#">The dumpsite of Lindane Alfa, Beta and Delta isomers is a concrete pool with a bottom not protected with concrete or membrane layer. The suspect is that the leakage of HCH and other POPs takes place for long period of time in the underground soil and underground water.</a>
<b>Bio-concentration or bio-accumulation factor, based on measured values (unless monitoring data are judged to meet this need)</b>	<p><sup>2</sup><a href="#">The leakage of HCH in ground water contaminated Vardar river empties into Mediterranean sea. This contamination is proved by investigation of ground water. Bio concentration in flora and fauna of the river Vardar is not examined.</a></p> <p><sup>3</sup><a href="#">One study showed as a collateral result increased levels of lindane in the sera of prepubertal girls from Macedonia</a></p>

<b>(d) Monitoring data (provide summary information and relevant references)</b>
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<sup>2</sup>[Monitoring data exist only recently in the Environmental study of OHIS where soil and groundwater of dumpsites and the surroundings where investigated. Environmental study “Identification of pollutants and their sources in the plants of “OHIS” Stock company Skopje” is edited by BENA with main experts: Prof.Hadzijordanov, PhDTanevski and Vosniakos.](#)

<sup>3</sup>[No monitoring data concerning health impact is available.](#)

<b>(e) Exposure in local areas (provide summary information and relevant references)</b>	
<b>- general</b>	<sup>2</sup> <a href="#">Contamination of soil and ground water</a>
<b>- as a result of long-range environmental transport</b>	<sup>2</sup> <a href="#">Bio contamination is not investigated out of dumpsites</a>
<b>- information regarding bio-availability</b>	<sup>3</sup> <a href="#">Biocontamination explored of the sera</a>

**(f) National and international risk evaluations, assessments or profiles and labeling information and hazard classifications, as available (provide summary information and relevant references)**

The factory "OHIS" Chemical Industry in Skopje stopped the production of Lindane since 1977.

<sup>2</sup>[Local contamination is proved in the soil and groundwater to 12 m dept. There is no investigation of the river Vardar of different food products, flora and fauna in Republic of Macedonia. There is suspect that this contamination is draining into Vardar river \(river of Mediterranean sea\) and influence contamination in different environmental media of region of Vardar river valley and Mediterranean sea.](#)

**(g) Status of the chemical under international conventions**

Submitted for consideration to the next COP of the Stockholm Convention

In the Republic of Macedonia it is not banned with the existing legislation.