

FACTSHEET LINDANE'S DIRTY SECRET:

INDIAN FACILITIES DUMP TOXIC WASTE

OVERVIEW

Lindane, a much debated insecticide, listed in the Rotterdam Convention on Prior Informed Consent for trade control and severely restricted under the international protocol on Long-Range Transboundary Air Pollution, is manufactured in India and Romania.¹

Already banned and severely restricted in over 50 countries, lindane is widely considered a likely candidate for addition to the list of chemicals targeted for an international ban under the Stockholm Convention. Lindane meets the specific guidelines laid down by the Convention for targeting new POPs chemicals for elimination due to its toxicity to humans and wildlife, persistence in the environment, and long distance transportation by wind and air currents.

In North America, under North American Free Trade Agreement, the US, Canada and Mexico are finalizing a North America Regional Action Plan for lindane. Mexico has already committed to phase out all uses of lindane by the end of 2005 and Canada has phased out all agricultural uses in 2004. But there has been no such progress in the U.S., where regulators are facing strong pressure from U.S. seed treatment companies to maintain current lindane uses. Lindane is still being used in Canada in pharmaceutical products.²

While the use of the lindane is debated in the west and international forums, the continued production of lindane in a developing country like India, with lax environmental laws and almost non-existent enforcement of environmental protection and occupational safety regulations, is leading to generation of dangerous stockpiles of highly persistent toxic wastes that are lying scattered and illegally disposed in the country sides, water bodies, agricultural fields and most likely in the bodies of people and cattle living around the waste dumps located close to lindane producing facilities.

Manufacture of 1 tonne of lindane (gamma hexachlorocyclohexane-HCH) produces 9 tonnes of waste - a complex "muck" of alpha, beta and delta HCH. HCH is produced by the chlorination of benzene in the presence of UV light to form alpha α -(70%), beta β -(12%), gamma γ -(10%) and delta δ -(7%) HCH respectively. Gamma HCH or lindane is purified from rest of the HCH isomers and rest becomes "muck" which in addition to lindane becomes an environmental liability due to highly persistence nature of the HCH isomers, specially beta and delta HCH.³

POLICY FOR USE IN INDIA

In India lindane formulations are registered for use in pharmaceutical products for control of head lice and scabies on people. It is also registered for use to control fly, flea, cockroach, mosquito, bed bug, and beetle populations. In agriculture, it is registered for use to control pests in cotton, sugarcane, pumpkin, cabbage, onion, apple, walnut, maize, okhra, potato, tomato, cauliflower, radish, cucumber and beans.⁴

In the public health sector, there was a proposed move by the Ministry of Health to use lindane to control malaria vectors a few years back, which got shelved due to commercial barriers relating to procurement and costs.

Presently there is no policy for phasing out lindane in India. In fact, license for manufacturing lindane is easily available with the concerned government agency.

1 No information is available on China's current status of lindane production, the only other country that used to produce lindane.

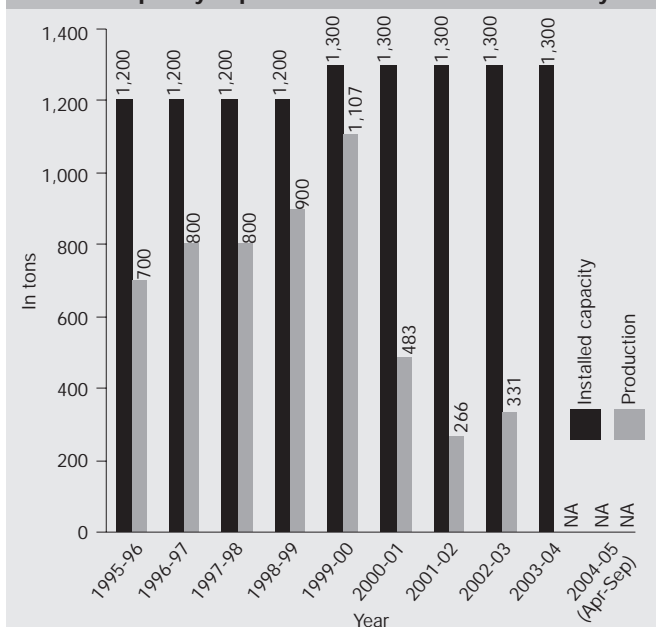
2 Pesticide Action Network North America, US, see www.panna.org/campaigns/lindane.html

3 "Killing you softly but surely with hazardous hexachlorocyclohexane waste", unpublished paper by Prof Rup Lal, Dept. of Zoology, Univ. of Delhi.

4 Central Insecticide Board and Registration Committee, Dept. of Plant Protection and Quarantine, Ministry of Agriculture, India.

GRAPH 1

Installed capacity & production of Lindane in last 10 years



Source: Department of Chemicals and Petrochemicals, Ministry of Chemicals.

PRODUCTION AND TRADE

India has total installed capacity of lindane (technical) production of 1,300 tonnes per annum (tpa), with two companies producing: Kanoria Chemicals and Industries Ltd with a capacity of 1000 tpa, and India Pesticides Limited with 300 tpa capacity. According to data available from Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilizers, between 1995 and 2005, India has produced 5,387 tonnes of technical grade lindane (see graph). Out of which 434.18 tonnes, worth Rs. 1454.09 lakhs (US\$3.3 million), has been exported (see table 1). Available data shows India has imported lindane twice — in 1996-97 from Korea (11 tonnes) and in 2003-04 from China (20 tonnes).⁵ According to the industry sources, 5-8% of the total lindane produced in the country is sold to the pharmaceutical companies in India (with 99.8% purity), 25-30% is used by the industry for formulation (which is used domestically) and 15- 20% is exported annually.⁶

⁵ Department of Chemicals and Petrochemicals, Ministry of Chemicals and Director General of Foreign Trade (DGFT), New Delhi

⁶ Personal communication with KCIL.

TABLE 1

Export of Lindane from India to various countries (Quantity)

Country	Quantity in thousands KGS								
	2004-05 (Apr-Sep)	2003-04	2002-03	2001-02	2000-01	1999-00	1998-99	1997-98	1996-97
Australia	-	-	-	-	-	-	5.70	-	9.00
Bangladesh	-	-	-	-	1.00	-	-	0.98	4.00
Baharain IS	0.20	-	-	-	-	-	-	-	-
Belgium	3.00	-	2.00	-	-	-	-	-	-
Brazil	-	-	-	-	-	-	-	12.50	24.00
Chinese Taipei	-	-	-	-	-	-	3.00	1.00	1.00
France	2.00	6.00	-	-	-	-	-	-	-
Israel	-	-	-	-	-	-	-	-	5.00
Indonesia	-	-	-	-	-	-	-	33.12	49.68
Japan	-	-	-	-	0.38	-	-	-	-
Kenya	-	-	-	-	-	-	-	2.50	-
Lebanon	-	-	-	-	-	-	-	0.72	-
Malaysia	-	6.00	-	-	-	-	-	-	-
Mexico	-	2.00	-	-	-	-	-	-	-
Nepal	-	-	-	-	-	-	-	1.95	-
Netherland	-	5.00	-	-	1.00	-	15.20	137.93	18.00
Pakistan	0.10	-	-	-	-	-	-	-	-
Saudi Arab	-	0.40	-	-	-	-	-	-	-
South Africa	1.00	2.50	-	-	-	-	-	16.56	-
Tanzania Rep	10.00	-	-	-	-	-	-	-	-
Thailand	-	1.00	-	-	-	-	-	-	-
U Arab Emts	-	42.56	-	-	-	-	-	-	-
UK	2.40	-	-	-	0.60	-	-	-	-
USA	-	0.80	-	-	-	-	-	-	-
Venezuela	-	-	-	-	-	-	2.40	-	-
TOTAL	18.7	66.26	2.00	0	2.98	0	26.3	207.26	110.68

Source: Director General of Foreign Trade (DGFT), New Delhi

INDIA'S LINDANE PRODUCERS

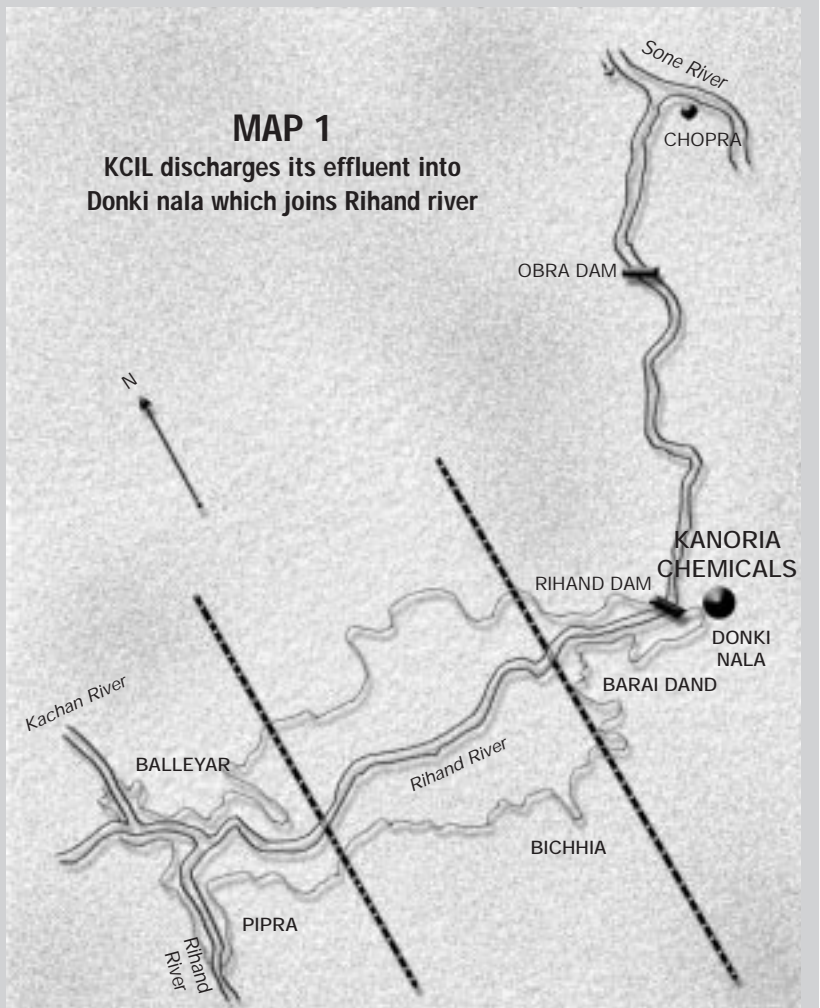
KCIL plant in Renukoot is mainly a Chlor Alkali plant producing caustic soda using mercury cell technology, which was set up in 1964 in technical collaboration with Kerbs & Co A.G. of Switzerland to produce 16500 tpa of caustic soda. In 1993, a lindane (technical) plant was commissioned to utilise chlorine produced as a by-product of the caustic soda process. Initial capacity of the lindane plant was 600 tpa, which was expanded to its present capacity of 1000 tpa in 1995. Subsequently, various formulations of lindane was added to the production capacity of the plant.^{7,8}

In 1995, KCIL became a member of Centre Internationale D'Etudes Du Lindane, a consortium of lindane producers based in Europe, which is now a defunct body. According to KCIL sources, even though the production capacity of the plant is 1000 tpa, lindane production has dropped to 331 tpa or less due to decreasing demand domestically and internationally. Its total production in 2001-2002 was 220 metric tones (MT), in 2002-2003 its was 331 MT and in 2003-2004 it was 257 MT with the sale values of. Rs 712.99 lakhs, Rs. 676.46 lakhs and Rs 555.66 lakhs respectively. The plant has a present inventory of 17 MT /year of lindane.

KCIL has markets for lindane products in northern belt of India particularly in Punjab and northern Uttar Pradesh. In the international market, KCIL exports lindane to African countries and in Southeast Asian countries. In the past, the plant has produced lindane for Belgium, Canada, the US, and Spain. As per KCIL sources, export to the US and Canada are routed through the African countries. Due to sliding demand of lindane in international market and a static domestic market, the company is planning to launch an campaign to boost the demand domestically, including door to door to campaigns in rural areas and promoting use of lindane for termite control.

7 KCIL produces the following formulations—lindane 1.3% DP (8250tpa), lindane 6% WDP (8250 tpa) lindane 6% granule (9900 tpa) and lindane 20% EC (220 m³).

8 Rapid EIA for Chlor-Alkali Plant Expansion of KCIL, August 2004



KANORIA CHEMICALS & INDUSTRIES LTD (KCIL)
Renukoot, Sonebhadra, Uttar Pradesh



KCIL's effluent discharge pipeline into Donki Nala

Effluent discharge into a drain from a pesticide plant in Chinhath Industrial Area

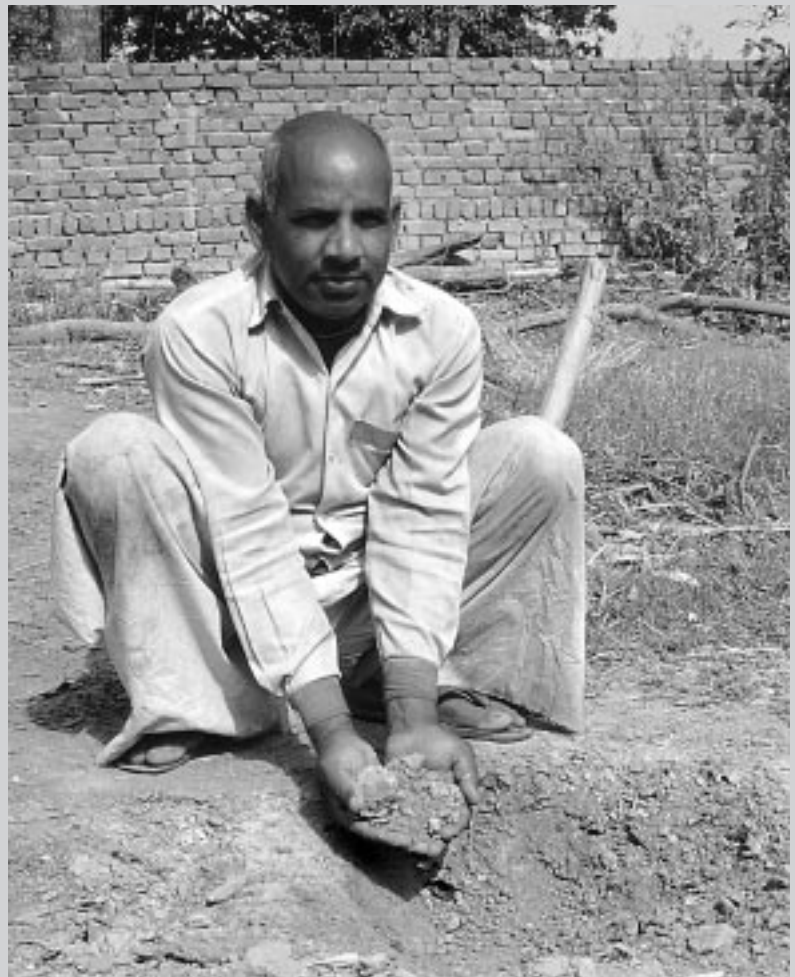


INDIA PESTICIDES LIMITED (IPL) Chinhath, Lucknow, Uttar Pradesh

India Pesticides limited is located at Chinhath Industrial Estate, around 20 km from the Lucknow city in Uttar Pradesh. The lindane plant was established in 1992, with an installed capacity of lindane (technical) production of 25 MT per month (300 MT per annum). Unlike KCIL, IPL utilizes its full production capacity and produces 300 MT/annum of lindane. IPL also has in-house lindane formulations facility, producing various lindane formulation.⁹ The plant has current inventory of 5 MT/year of lindane.

IPL has marketing offices for lindane in New Delhi, Chennai, Mumbai, Calcutta, Ahmedabad, Bhopal, Chandigarh, Pondichery, and Ludhiana. It also has international marketing office in Rotterdam port, Holland. According to the industry sources, IPL markets lindane in European and Southeast Asian countries.

⁹ IPL produces the following formulation—lindane EC (12500 liters per month), carbaryl lindane 4.4 granules, lindane 6% Granules, lindane 6.5 WDP, lindane 1.3%.



Illegal muck dump behind IPL factory in village Chakhar

ENVIRONMENTAL IMPACTS OF LINDANE FACILITIES

Blatant violations of environmental protection regulations has been documented in both lindane producing factories in India. KCIL, located on the northern bank of Rihand river, discharges its "treated" effluents into the Donki nala (rain water drain), which finally outfalls into the Gobind Sagar Dam or the Rihand Dam, about 1.5 kms from the factory. There are villages and forests within 500 meters of the factory.

In its annual report for 2002-03, Central Pollution Control Board (CPCB) reported high levels of lindane, DDT and aldrin in the areas surrounding KCIL and other factories (which incidentally do not manufacture any pesticides). In fact lindane was reported at 4 out of 6 ground water monitoring locations (handpumps/ wells), with the highest concentration being 277 ng/l recorded at Renukoot (Sheo Park Bazar, near HINDALCO gate, Renukoot). DDT was also recorded at 2 locations, with highest concentration of 216.2 ng/l at Obra (downstream of fly- ash pond of Obra Thermal Power Plant, Obra). Aldrin was recorded only at one location at Bina.

KCIL's lindane plant produced an estimated 6000 MT/year of muck, based on information about the volume of waste associated with the lindane production process. According to the industry, the muck was being stored in HDPE woven bags, with their mouths stitched and put in "designated secured landfill". This supposedly "secured landfill" had boulders and brick in the bottom followed by gravel and sand layer and HDPE lining. The muck bags after being stacked in "secured landfill" were covered with tarpaulin sheets to prevent leaching and seepage. In 2003 under CPCB's guidance 33,256 MT of muck out of 44,929 MT was "encapsulated" by KCIL.¹⁰

Currently industry representatives claim that the plants are converting the HCH isomer containing muck into Trichlorobenzene (TCB). The plant has an installed capacity of 12,000 tonnes per annum for production of TCB¹¹ (there is no data available for actual TCB production). However, experts say that only α - and γ -HCH can be converted into TCB and not the other two isomers β - and δ -HCH.

Further investigation of the waste disposal practices at the plant revealed that the muck generated from lindane



Low lying area near KCIL factory where waste is dumped illegally by the factory

¹⁰ Personal communication with Dr DD Basu, Sr. Scientist, Central Pollution Control Board 2005.

¹¹ Ibid note 8.



IPL's "Muck Yard" seen behind the plant. Worker's shed and cycle stand is located right next to the yard

village called Ummaria, about 20 kms away from the factory, has been leased from a local villager to dump the "muck". Although the villagers have protested against such illegal dumping, the combined power of the company and the landholder has meant they have been forced to accept this toxic waste in their village.

Scientific investigation by a Delhi university team revealed extremely high levels of HCH residues in soil around the factory, muck yard and villages where muck has been disposed illegally.

<i>Open dump site and sealed dump yard</i>	= 6.6 mg/g soil
<i>Rice field around the dumping site</i>	= 0.6 mg/g soil
<i>Around pesticide muck Yard</i>	= 4.1 mg/g soil
<i>Water sample from the Nallah some 20 km away from IPL</i>	= 7 µg/ml water

IPL staff, like KCIL, claims that the muck left after purification of γ -HCH is "converted to trichlorobenzene which is then exported to US and other countries." However, storage of large and unspecified quantity of waste in the "Muck Yard" indicated no such conversion to TCB. It is most likely that the waste is being illegally disposed of in the drain next to the yard and in low-lying areas. Moreover, as mentioned earlier, β - and δ -HCH isomers cannot be converted to TCB.

The Delhi university team, researching bioremediation of HCH contaminated sites, found an area completely covered

production is dumped in the compound adjacent to the plant, and whenever it gets filled up, a contractor is hired to remove the muck and dump it in low lying areas around the factory. Sometimes the muck is also mixed with water and flushed into the Donki nala, according to informed sources.

India Pesticides limited claims to have all requisite clearances and pollution abatement technologies as per the law. Yet a look at their muck yard situated adjacent to the factory and illegal "muck" dumps in villages around and at a distance from the factory, reveals the gross environmental violations practiced by this factory.

According to the people from the nearby villages, IPL dumped all its "muck" in a deep pit at a village called Chakhar situated right behind the factory, prior to 2000. But due to complaints about the unbearable smell and unexplained deaths of cattles which grazed in the area, IPL had to change its dumping site. It contracted "muck" dumping to a local contractor who started dumping it in nearby low lying areas, along the national highway, along roadsides near the village of Palhori and along the banks of the Indra canal. In the last few years, a low-lying area in a

Lindane in soil and packaged drinking water

A Delhi university team collected and analysed 45 soil samples of surface and sub-surface soil from agricultural sites of Delhi, Haryana, Haridwar, Uttar Pradesh and around HCH manufacturing plant of India Pesticide Ltd and nine samples of different commercial brands of drinking water from markets in Delhi for the presence of HCH residues. Thirty-nine of the 45 soil samples contained residues of β -HCH (2.5µg/kg-463 mg/kg of soil) and the remaining showed the presence of γ -HCH (0.08 µg/kg – 43 mg/kg of soil). All nine samples of drinking water were found to contain residues of HCH, with three brands showing 99,240 and 141 folds higher levels of HCH residue compared to EEC norms.

Source: "Residue of hexachlorocyclohexane isomers in soil and water samples from Delhi and adjoining areas" By Om Prakash, et al, Dept. of Zoology, Univ. of Delhi In Current Science, Vol. 87, No. 1, 10 July 2004

by white "HCH Muck" in Devan Road at Ummari village at Bara Banki district, Lucknow. The vegetation around the dumping area has almost disappeared and the area is nearly a clear white dumping site with HCH muck about 6 ft. deep (the area used to be a huge pit -70 x 70 x 2m from which soil had been taken out over the years for making bricks). There are homes located very close to the dumpsite, and villagers informed the team that wheat, rice, capsicum and other crops have suffered extensive damage due to the dry muck blown by winds and carried to fields through rainwater. The team members observed that, "...we witnessed a death trap put up by the industry to kill the inhabitants and also create a disastrous situation of leaching of the waste from this dump site which probably will continue poisoning humans, cattle and all living organisms for not less than 100 years."¹²

WORKING CONDITION IN THE LINDANE FACILITIES

No occupational health data is available for workers in the two lindane facilities, but visits to both the factories revealed substandard working conditions and little regard for occupational safety and health of the workers. Although KCIL has an automated

lindane plant, workers were observed packing lindane in containers with bare hands without any safety equipment. Some of the workers revealed that the issuance of safety gears masks and hand gloves were only "ceremonial", reserved for visits or inspections by officials. In fact, most of the workers were contractual workers, which usually means they would not be covered by any health insurance or other social security schemes that the company might have. Interestingly, workers noted that they were being constantly shifted from their workstations within the factory.

In IPL, the Delhi university team observed an extremely odd smell within the factory, which became unbearable with time. According to the team, the workers did not seem to be aware of the toxic waste and chemicals they were handling. Nobody wore any protective personal gear such as masks and gloves. Researchers noted that workers looked "sick and pale".

A report published by Directorate General Factory Advice Service & Labour Institutes (DGFASLI), Ministry of Labour in 2002, shows high levels of airborne lindane at various locations within a lindane (T) manufacturing plant (name not revealed) surveyed by the organisation.



IPL's illegal muck dumping area in village Ummaria

TABLE 2

Airborne lindane found in various locations inside the lindane plant surveyed by DGFASLI¹³

Location/operation within the lindane plant	Range mg/M ³	Average mg/M ³	TLV mg/M ³
Centrifuge machine	0.75-1.66	1.77	0.5
Near duct connecting centrifuge to cyclone	1.29-2.10	1.67	0.5
Cyclone drying fan area	0.96-2.13	1.57	0.5
Near filling area	0.48-2.24	1.65	0.5
Crude lindane charging unit 2	0.30-2.50	1.28	0.5
Crude lindane charging unit 3	0.27-5.00	2.54	0.5
Muck centrifuge machine	0.19-1.10	0.58	0.5
Muck discharge point	0.06	0.06	0.5
Muck drier dust storage	1.0-1.66	1.33	0.5
Crude lindane centrifuge discharge	0.25-0.62	0.44	0.5
Pure lindane centrifuge machine JA	0.58-1.11	0.84	0.5
Pure lindane centrifuge machine JB	0.15-1.12	0.58	0.5
Pure lindane crystalliser heating vessel	0.23	0.23	0.5
Cyclone flash drier (charging)	1.42-2.66	2.04	0.5
Charging flash drier centre	0.41-2.22	1.32	0.5
Near product hopper microniser	0.25-1.62	0.86	0.5

Source: DGFASLI, 2002

DGFASLI also noted that in many sections inside the lindane plant there were no labels or emergency information displayed, vents in underground benzene storage tanks were not properly fitted and sealed, workers were in direct contact with benzene while filling the tanks, there were no precaution against fire hazards, lack of any alarm systems between different sections (e.g., BHC charging section), workers were seen using only a piece of cloth to cover their faces while removing "muck" from the HCH muck filter, which emits toxic vapours of alcohol and BHC; manual removal of muck by workers during power failures; manual transfer of crude lindane from crude lindane plant to purified lindane plant in HDPE bags (filled manually), which are again manually emptied into tanks for charging. Handling of wet lindane, after washing and separation, filled and transferred manually by workers to the drier section. The above working conditions indicate little regard for workers' health and

safety, and dangerous working conditions inside the lindane plant surveyed by DGFASLI.

CONCLUSION

The international community could take years to review and debate whether HCH/lindane qualifies for a global phaseout under the Stockholm Convention. Meanwhile, gross violations and criminal negligence by dirty production facilities in developing countries continues. This is reason enough for the international community to move quickly to phase out this dangerous organochlorine. A global ban of lindane is long overdue.

¹³ Survey of Process Safety, Health & Work Environment in Pesticide Industries in India. 2002. Directorate General Factory Advice Service & Labour Institutes, Ministry of Labour, Government of India, Mumbai.