[環境省第２回ＰＯＰｓ対策検討会資料]

参考資料５

ヘキサクロロベンゼンのPBT国家行動計画（ドラフト）
米国環境保護庁 PBT物質 ヘキサクロロベンゼンWG
2000.12.8

目次

Draft

PBT National Action Plan

For

Hexachlorobenzene (HCB)

for Public Review

Prepared by

The USEPA Persistent, Bioaccumulative and Toxic Pollutants (PBT) HCB Workgroup

December 8, 2000

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EXECUTIVE SUMMARY

On November 16, 1998, the U.S. Environmental Protection Agency (EPA) released its Agency-wide Multimedia Strategy for Priority Persistent, Bioaccumulative, and Toxic (PBT) Pollutants (PBT Strategy). The goal of the PBT Strategy is to identify and reduce risks to human health and the environment from current and future exposure to priority PBT pollutants. This document serves as the Draft National Action Plan for hexachlorobenzene (HCB), one of the 12 Level 1 priority PBT pollutants identified for the initial focus of action in the PBT Strategy.

HCB is a highly persistent environmental toxin that was synthesized and used from the 1940s to the late 1970s as a fungicide on grain seeds such as wheat. In the U.S., the last registered use as a pesticide was voluntarily canceled in 1984. HCB is no longer commercially produced in the U.S. However, HCB is currently formed as an inadvertent by-product in the production of silicone products, metal cans (surface coating), pesticides, chlorine, and in other chlorination processes. HCB is released from publicly owned treatment works, commercial refuse systems, and petroleum refineries. The use of chlorinated organic compounds in the production of microchips by aluminum plasma etching is also known to generate HCB wastes. Long-range atmospheric transport and deposition from global sources are also thought to contribute to loadings within the U.S.

HCB is considered a probable human carcinogen and is toxic by all routes of exposure. The general population appears to be exposed to very low concentrations of HCB, primarily through ingestion of meat, dairy products, poultry, and fish. Ingestion of HCB-contaminated fish is potentially the most significant source of exposure. HCB bioaccumulates in fish, marine animals, birds, lichens, and their predators. HCB has been found in fish and wildlife throughout the U.S., though the Great Lakes and Gulf coast are areas of particularly high contamination. Native populations who consume locally caught fish and game species may be particularly susceptible to high levels of HCB exposure.

As a persistent, bioaccumulative, and toxic substance, HCB is included in Binational Toxics Strategy efforts to virtually eliminate such substances from the Great Lakes Basin. HCB is also measured or reported in a number of monitoring programs in the U.S., such as TRI, the National Study of Chemical Residues in Fish, NHANES, and NOAA's Mussel Watch Project. As a global pollutant of concern, HCB is listed in several international initiatives to reduce or control its release.

While current sources of HCB release have been identified, there remain information gaps related to the magnitude of known and suspected sources of HCB, the extent of pollution resulting from long-range transport, and the content of HCB in sinks such as sediments and POTW sludge that may contribute to environmental cycling within U.S. boundaries. The strategic approach of the Agency therefore will involve voluntary initiatives to effect reductions and minimize media transfers, information collection to verify sources and sinks, and increased involvement and assistance with international groups and other countries to reduce atmospheric deposition in the U.S. Key actions to reduce HCB are presented in Table ES1.

Table ES1. Strategic Approach to the Reduction of HCB

Strategic Approach		
Focus	**Key Actions**	**Key Players & Stakeholders**
1. Identify and implement voluntary initiatives and outreach opportunities, while minimizing multi-media transfers	– Source Reduction Techniques – Industry Partnerships – Outreach/Education – POTW Pollution Prevention Programs	– GLNPO, OSW, OW, ORD, Regions, States, Tribes, Industry stakeholders, Community groups, POTWs
2. Continue to collect information and integrate data across media regarding sources, sinks, releases, environmental trends, food and body burden levels	– Identify local or regional hot spots (IADN, National Study of Chemical Residues in Fish, NHANES, NOAA Mussel Watch) – Review current lists and existing data – Quantify reductions achieved through MACT standards promulgated for other substances – Research potential for HCB contamination in consumer products	– OW, OSW, OAQPS, ORD, GLNPO, OPPT, States, Tribes, Community groups
3. Work with international organizations to assess the significance of long-range transport from other countries and to foster the proliferation of P2 or control technology measures	– Continue current international efforts (BNS, CEC/SMOC, LRTAP, UNEP, AMAP) – Assess the significance of long range transport from other countries and identify countries with opportunities to reduce HCB emissions	– OIA, OAR, ORD, OPPTS, GLNPO, States, Tribes, Community groups

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) created the Persistent, Bioaccumulative and Toxic (PBT) Initiative and developed an agency-wide PBT strategy to address the remaining challenges of priority PBT pollutants in the environment. These pollutants pose risks because they are toxic, persist in ecosystems, and accumulate in fish and up the food chain. The challenges remaining for PBT pollutants stem from the fact that many of them tend to be transported long distances in the air, transfer rather easily among air, water, and land, linger for generations, and span boundaries of programs and geography, making EPA's traditional single-statute approaches less than the full solution to reducing risks from PBTs. Due to a number of adverse health and ecological effects linked to PBT pollutants, and the fact that fetuses and children are especially vulnerable to health damage from PBT pollutants present in the food supply and the environment, EPA must aim for further reductions in PBT risks. To achieve further reductions, a multimedia approach is necessary. Accordingly, through the PBT Strategy, EPA has committed to create an enduring cross-office system that would address the cross-media issues associated with priority PBT pollutants.

A key element of the PBT Strategy is developing and implementing national action plans for priority PBTs. These action plans are to draw upon the full array of EPA's statutory authorities and national programs, build on voluntary efforts under the Great Lakes Binational Toxics Strategy, and use regulatory action where voluntary efforts are insufficient. The action plans are to consider enforcement and compliance, international coordination, place-based remediation of existing PBT contamination, research, technology development and monitoring, community and sector-based projects, the use of outreach and public advisories, and opportunities to integrate efforts across chemicals.

This document serves as the Draft National Action Plan for hexachlorobenzene (HCB), which is one of the 12 Level 1 priority PBT pollutants identified for the initial focus of action in the PBT Strategy. This draft action plan will first look at the environmental and human health baseline for HCB and the strategic questions that arise from considering this baseline. The plan will then look at the existing programmatic baseline of how EPA has been addressing HCB as an agency. Finally, the plan will outline proposed goals and actions specifically aimed at reducing risk associated with current and future exposure to HCB, but which will in some cases also aid in reducing human exposures to other priority PBT pollutants. In accordance with the goals of the overall PBT strategy, the actions have been evaluated in terms of their potential to effect reductions in HCB, as well as other PBT pollutants, from various sectors, and across all environmental media. In doing so, the plan will relate these proposals (and others considered) back to the environmental/health baseline and EPA programmatic baseline and will qualitatively evaluate the anticipated impact of the proposed actions.

2.0 DESCRIPTION OF HCB

Hexachlorobenzene (HCB, CAS number 118-74-1) is a white, crystalline solid, with minimal water solubility, 5 µg/L at 25 °C (Ramamoorthy and Ramamoorthy, 1997). HCB was synthesized and used from the 1940s to the late 1970s as a fungicide (pesticide) on grain seeds such as wheat. HCB was used in the past as a solvent and as an intermediate and/or additive in various manufacturing processes, including the production of PVC, pyrotechnics and ammunition, dyes, and pentachlorophenol. Although HCB is no longer used directly as a pesticide, it is currently formed as an inadvertent by-product at trace levels in the production of chemical solvents, chlorine and chlorine-containing compounds, and several currently used pesticides. Combustion of chlorinated waste material may also emit HCB. Other sources of HCB are described in Section 5.0.

HCB is a highly persistent environmental toxin that degrades slowly in air and remains in the atmosphere through long range transport. Current research suggests that HCB has a half-life from 2.7 to 6 years in water and in the atmosphere, and may have a half life of more than 6 years in soil (Mackay et al., 1992; Howard et al., 1991 as discussed in Nomination Dossier for HCB from Canada). In water, HCB binds to sediments and suspended matter. In soil, HCB binds strongly and generally does not leach to water. Transport to ground water is slow, but varies with the organic makeup of the soil, as HCB tends to bind more strongly to soils with high organic content. Co-solvents in active/inactive sites can mobilize HCB.

HCB bioaccumulates in both terrestrial and aquatic food chains. HCB accumulates in the fatty tissues; its presence in fish, plants, and wild game species can be a source of ingestion exposure for humans. In the U.S., environmental levels peaked in the 1970s and have generally declined since that time. For example, HCB levels in Great Lakes sediments were reported to have peaked at about 460 ppb in the years 1971-1976 and declined to 270 ppb in 1976-1980 (ATSDR, 1999). The decline in environmental concentrations is primarily due to the cancellation of HCB as a registered pesticide.

3.0 HEALTH EFFECTS

HCB is considered a probable human carcinogen and is toxic by all routes of exposure. Short-term high exposures can lead to kidney and liver damage, central nervous system excitation and seizures, circulatory collapse, and respiratory depression. For example, an incident in Turkey in the 1950s in which several thousand people ingested wheat sprayed with 10% HCB resulted in the development of toxic porphyria, increased incidence of enlarged thyroids, death of children under one year of age, and death of children born to mothers who had ingested the contaminated wheat. Some studies report links between porphyria and cancer. Based on studies conducted on animals, long-term low exposures may damage a developing fetus, cause cancer, lead to kidney and liver damage, and cause fatigue and skin irritation.

4.0 HUMAN AND WILDLIFE EXPOSURE

Human exposure pathways for HCB are inhalation, ingestion of contaminated food, and skin contact with contaminated soil. Ingestion of HCB-contaminated fish and other wildlife is potentially the most significant source of exposure. A chronic oral Minimal Risk Level (MRL) for HCB has been determined to be 0.02 µg/kg/day. An MRL is an estimate of daily human exposure to a substance that is likely to be without appreciable risk of adverse effects (carcinogenic) over a specified duration of exposure (ATSDR, 1999). An average adult (70 kg) consuming 0.25 lbs of fish per day with an average HCB level (5.8 ppb) would correspond to an exposure at 50 percent of the daily MRL for that individual. Consumption of fish having the maximum-detected HCB level (913 ng/g) (Kuehl and Butterworth, 1994) would correspond to ingestion of amounts 75-fold higher than the MRL.

The general population appears to be exposed to very low concentrations of HCB. Primary exposure occurs through ingestion of contaminated food, particularly meat, dairy products, poultry, and fish. The following maximum detected HCB concentrations in foods analyzed from 1985 to 1991 through FDA Total Diet Studies were reported: pears (1.0 ppb), whole milk (0.2 ppb), low-fat (2%) milk (0.1 ppb), pork (0.4 ppb), and peanut butter (5.0 ppb). The frequency of detection of HCB in FDA Total Diet Studies was less than 2% in 1994, compared to 9% in 1982-1984 (ATSDR, 1999). Additional, although significantly less, exposure may occur through inhalation or dermal contact.

Subpopulations who may be exposed to higher levels of HCB than the general population include workers occupationally exposed to HCB, individuals living near facilities where HCB is produced as a byproduct, and individuals living near current or former National Priority List (NPL) hazardous waste sites where HCB is present. HCB concentrations in sediment collected from a disposal site near Sorrento, Louisiana, reached 130,000 ppb, and a maximum HCB concentration of 53,130 ppb was detected in soil at an industrial site near Geismar, Louisiana (ATSDR, 1999). Recreational and subsistence fishermen who consume higher amounts of locally caught fish and bivalves (mussels, oysters, clams) from contaminated waters, and native populations (including Native American populations such as the Inuits of Alaska) who consume caribou and other game species, are additional subpopulations with potentially higher exposures. For example, HCB concentrations of 220-930 ppb reported in the blubber of beluga whales from the St. Lawrence Estuary to Northern Quebec are a potential health risk to native populations for whom whale meats and blubber are a significant part of the diet (ATSDR, 1999). Nursing infants in these areas may also be particularly susceptible to effects due to the singular nature of their diet.

HCB has been found in fish and wildlife throughout the U.S., but the Great Lakes and Gulf coast are areas of particularly high contamination (ATSDR, 1999). Data collected from the National Oceanic and Atmospheric Administration's (NOAA) Mussel Watch Program show that HCB concentrations in mussels from the Great Lakes were more than five times higher than HCB levels found in mussels along marine coasts of the U.S. (East coast, West coast, Gulf coast, and marine waters). The highest HCB concentrations were found on the Niagara River at Buffalo, New York (36.7 ng/g [ppb]), and near Ashtabula, Ohio (11.8 ng/g), in central Lake Erie (Robertson and Lauenstein, 1998). In the 1992 National Study of Chemical Residues in Fish (Kuehl and Butterworth, 1994), HCB was found at 46 percent of almost 400 sites in the U.S. at a mean concentration of 5.8 ng/g. Although many fish species were sampled in this study, the highest concentration of HCB (913 ng/g) was found in sea catfish from Freeport, Texas, near a pesticide plant. Other sites with high concentrations of HCB in this study, with a single value for composite samples listed parenthetically, were: Louisiana at Bayou D'Inde (202 ng/g, catfish), the Mississippi River near chemical manufacturing plants (93.7 ng/g, carp), and the Calcasieu River near a Superfund site (75 ng/g, sea catfish). Fish advisories for HCB contained in EPA's Listing of Fish and Wildlife Advisories (http://fish.rti.org/) for 1997 were for Bayou D'Inde (all fish and shellfish) and Devil's Swamp (all fish) in Louisiana, and the Tuscarawas River in Ohio (for several species of bass, catfish, bullhead, and carp).

5.0 ENVIRONMENTAL BASELINE

5.1 SCOPE OF THE PROBLEM AND CURRENT STATUS AND TRENDS

Hexachlorobenzene was produced as a fungicide in the U.S. until 1984, when its last registered use as a pesticide was voluntarily canceled. Sales and use may have continued until stocks were depleted. HCB is no longer commercially produced in the U.S. However, HCB is currently formed as an inadvertent by-product in certain commercial processes and products. For example, HCB is emitted during the production of chlorine and is formed at trace levels in the production of some chlorinated pesticides. Currently, those registered pesticides known to contain HCB as an impurity include dacthal (DCPA), chlorothalonil, picloram, pentachloronitrobenzene (PCNB), and pentachlorophenol (PCP). HCB has been detected in atrazine, simazine, and lindane, but these pesticides do not commonly contain HCB (Jensen, 1999).

EPA's 1996 National Toxics Inventory estimates that approximately 2,000 pounds of HCB are released to air each year. Water releases are relatively minor, on the order of 300 pounds per year, according to Toxics Release Inventory (TRI) reports. However, millions of pounds of HCB waste are generated from industrial processes each year; these wastes are treated and disposed as hazardous waste and are not thought to be entering the environment.

Environmental monitoring studies have shown that HCB may be recycled in the environment from contaminated soils and sediments of lakes and rivers. Current industrial releases of HCB to air and water also cycle through the environment via processes of volatilization and deposition. Long-range atmospheric transport and deposition from global sources are also thought to contribute to loadings within the U.S., although the magnitude of this contribution has not been determined. Domestic sources of HCB to air, water, and waste, as well as non-point and reservoir sources, are described below.

5.2 QUANTITATIVE AND QUALITATIVE DATA ON CURRENT SOURCES AND RESERVOIRS

5.2.1 Products

HCB as a manufacturing residue in applied pesticides, or as a contaminant in the soil, has the potential to be taken up by crops. Chlorothalonil, for example, is a fungicide containing HCB that is used on many crop plants, including broccoli, carrots, green beans, peas, onions, squash, strawberries, tomatoes, and watermelon. In a June, 1999 summary of pesticide residues found in a Food and Drug Administration (FDA) Total Diet Study, HCB was reported at low levels in a variety of foods. For the foods reported to contain HCB in FDA's summary, the levels ranged from a mean of 0.2 ppb (ng/g) in peanut butter to a mean of 1.2 ppb (ng/g) in butter (FDA, 1999). The pesticide residue levels found are well below regulatory standards. In addition to Total Diet Study foods, FDA analyzed baby food in an adjunct survey in 1991-1998 and reported one finding of HCB at a level of 1 ppb (FDA, 1998).

The presence of HCB at residue levels (ppb) in household and consumer products is not known.

5.2.2 Air Emissions

This section uses inventory data from EPA's 1996 National Toxics Inventory (NTI). The 1996 NTI was developed with emissions data collected from the states and supplemented with data gathered while developing Maximum Achievable Control Technology (MACT) standards and with Toxic Release Inventory (TRI) data. For those states not submitting emissions data and for those sources not included in the state data, estimates of emissions were made to prepare a complete model-ready national 1996 inventory. The inventory has undergone extensive internal review at EPA and external review by industry, state and local agencies, and the public. Table 1 presents national HCB emissions from 1996 NTI data.

Industrial Inorganic Chemicals

In the 1996 NTI, emissions from the production of industrial inorganic chemicals represent the largest source (958 lbs or 48%) of total HCB emissions. The production of silicone-based products, which includes antifoams, emulsions, hardcoats, elastomers, adhesives, release coatings, and sealants, is reported as the source of HCB emissions from this source category. The mechanism by which HCB is generated is not known. However, the process of reducing silica (sand) to elemental silicon by reaction with methyl chloride at high temperature (300 ºC) in the presence of a copper catalyst may provide conditions that allow the formation of HCB.

Table 1. National HCB Emissions from 1996 National Toxics Inventory Data

	Source Category	SIC Code	1996 HCB Emissions (lbs/yr)	% of Total HCB Emissions
1	Industrial Inorganic Chemicals[1]	2819	958	48%
2	Metal Can (Surface Coating)	3411	420	21%
3	Pesticide Application	NA	216	11%
4	Chlorine Production	2869	142	7.1%
5	Publicly Owned Treatment Works (POTW) Emissions	4952	52	2.6%
6	Refuse Systems	4953	49	2.5%
7	Petroleum Refining	2911	32	1.6%
8	Other[2]		131	6.6%
	TOTAL		1999[3]	100%

[1] This category represents the manufacture of silicone products.
[2] This category is comprised of 16 minor source categories with individual emissions no greater than 30 lbs/year.
[3] The sum of HCB emissions does not equal the reported total due to rounding of source category emissions.

Metal Can (Surface Coating)

The application of surface coatings to both the inside and outside of metal cans is reported to account for 420 lbs, or 21%, of total HCB emissions in the 1996 NTI. A MACT standard is currently being developed for control of hazardous air pollutant (HAP) emissions from the metal can surface coating industry. The majority of HAP emissions from metal can surface coating facilities are from the coating application and curing processes. Other potential sources of HAP emissions are coating equipment cleaning operations, coating mixing and thinning operations, storage of coatings and solvents, and can washing operations (USEPA, 1998a).

Metal cans are used to contain a wide variety of products, including beverages, foods, aerosol products, paints, medicines, and other products. Approximately 365 plants in the U.S. are engaged in one or more can manufacturing processes, as identified by SIC code 3411. Can manufacturing plants are concentrated in California, Texas, and several eastern and midwestern states.

Pesticides Application

When pesticides containing residue levels of HCB are applied to crops, lawns, or gardens, HCB is released into the environment. Emissions from pesticide application result from volatilization and/or resuspension of all components of the pesticide formulation. Although the

HCB content of pesticides is low (ppm range), a significant proportion of that HCB, up to 100%, has been estimated as a release to air (EPA, 1998; Nash and Gish, 1989). HCB emissions from pesticide applications are estimated at 216 lbs/year in the 1996 NTI.

The estimate for HCB emissions from pesticide application depends on the usage rates of HCB-containing pesticides, the HCB content of those pesticides, and the rate of HCB volatilization from the pesticide formulation when it is applied. In supporting documentation for the 1996 NTI, EPA states that 1996 NTI area source category emissions were compiled from state emissions data or from activity data and emission factors. In developing area source estimates from activity data and emission factors, EPA used emission factors based on recent test data gathered from the MACT program, state and local agencies, or industry; source activity data were obtained from published sources such as government statistical documents and databases, industry trade publications, and commercially published business directories and journals. Considering the wide range of volatilization rates and the lack of data regarding pesticide HCB levels, there may be considerable uncertainty associated with the inventory estimate for pesticides application.

Chlorine Production

HCB emissions from chlorine production are estimated at 142 lbs/year in the 1996 NTI. Chlorine and caustic soda (alkali) are produced concurrently in an electrolytic cell containing a chloride salt solution. In addition to air emissions, millions of pounds of HCB wastes are reported annually to TRI by the chlor-alkali sector (see Table 2).

Publicly Owned Treatment Works

EPA estimates 52 lbs/year of HCB emissions from publicly owned treatment works (POTWs). The source of HCB at POTWs may be the receiving influent containing HCB from industrial facilities discharging HCB wastes, from agricultural runoff, or from resuspension of contaminated sediments. The use of HCB-contaminated ferric chloride in treatment operations may also contribute to HCB emissions from POTWs (WLSSD, 1998). Ferric chloride is a chemical used in wastewater treatment and water purification to control odor and to facilitate settling of particles in the water. The source of HCB contamination of ferric chloride has not been determined, but may be due to its manufacture from low-grade hydrochloric acid (HCl) that is available from other industry operations (WLSSD, 1998).

HCB may result from the incineration of sewage sludge, it may volatilize from the water surface during process operations or from sewage sludge that is land-applied or dried on-site. In addition, it may be released to surface water in POTW effluent. The quantity of HCB present at sewage treatment plants varies by treatment plant, depending on the type of wastewater discharge received (e.g., rural, urban, industrial) and the type of treatment conducted.

Refuse Systems

An estimated 49 lbs/year of HCB emissions are released from refuse systems (SIC code 4953). These are waste management firms that accept HCB wastes generated by other industrial sectors. Methods of treatment and disposal include incineration/thermal treatment or landfill disposal/surface impoundment. Fugitive HCB emissions are thought to be released during the disposal process.

Petroleum Refining

Petroleum refining (SID code 2911) is estimated to release 32 lbs/year in the1996 NTI. The source of HCB at petroleum refineries is not known. Speculation could center on the catalytic reforming process due to the potential for dioxin releases from this process. Regeneration of spent catalyst requires oxidative removal of contaminants at temperatures of 400-455 °C and then reactivation of the catalyst through the use of chorine or chlorinated compounds (e.g., methylene chloride, 1,1,1-trichloroethane, and ethylene dichloride) at 400-500 °C.

Other

A total of 131 lbs/year of HCB emissions are reported for other minor source categories, including: Miscellaneous Metal Parts & Products (Surface Coating); Hydrochloric Acid Production; Pesticides & Agricultural Chemicals; Carbon & Graphite Products; Portland Cement Manufacturing; Miscellaneous Organic Chemical Processes; Residential Open Burning; and Gaskets, Packing & Sealing Devices. HCB emissions for any one of these source categories do not exceed 30 lbs/year. A few of these source categories are described below.

Miscellaneous Metal Parts & Products (Surface Coating)

Miscellaneous metal parts & products (surface coating) include photocopy and photographic equipment. The manufacture of this equipment is reported to contribute minor amounts of HCB emissions. A MACT standard is being developed for Miscellaneous Metal Parts & Products (Surface Coating). The anticipated effect of this MACT standard on HCB emissions has not been determined.

Hydrochloric Acid Production

Estimated HCB emissions from hydrochloric acid production from the 1996 NTI are 14 pounds per year. This source category is comprised of about 44 companies operating 82 plants in the U.S. Over 90% of the hydrochloric acid (HCl) produced in the U.S. is produced as a byproduct in the manufacture of chlorinated organic chemicals such as vinyl chloride. Most of the remaining HCl is produced via direct synthesis from the burning of hydrogen and chlorine gases. A small percentage of the HCl comes from other manufacturing processes such as incineration of chlorinated organic waste gases, reaction of sulfuric acid with metal chlorides, and production of fumed silica. HCB may be generated during the production of HCl during chlorinated organic chemical production and incineration of chlorinated organic wastes. However, emissions from both of these processes are regulated under the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Hazardous Organic NESHAP (HON), which requires emission standards to control organic HAP emissions.

HCB generated during HCl production may contaminate some grades of HCl produced. For example, ferric chloride that is manufactured from low-grade HCl and used in wastewater treatment operations has been shown to contain HCB (WLSSD, 1998).

Pesticides & Agricultural Chemicals

HCB is generated as an impurity in the manufacture of chlorinated pesticides. EPA regulates the maximum allowable concentrations of HCB as a contaminant in the following pesticides: atrazine, chlorothalonil, dimethyltetrachloro-terephthalate (DCPA), lindane, pentachloronitrobenzene (PCNB), picloram, and simazine. Although HCB can be formed as a trace impurity in atrazine, simazine, and lindane, these pesticides do not commonly contain HCB (Jensen, 1999). According to information obtained from pesticide manufacturers, HCB concentrations range from 8 to 50 ppm in picloram, from 18 to 26 ppm in chlorothalonil, up to 500 ppm in PCNB, and from 700 to 3000 ppm in DCPA (Benazon, 1999).

Residential Open Burning

HCB was detected in an emissions characterization study undertaken by EPA to quantify emissions from the simulated burning of household waste material in barrels (EPA, 1997). The prevalence of residential open burning is not certain, but may be common in rural areas and Tribal communities where there are fewer waste removal alternatives. In a survey of 760 residents of northeast Minnesota and northwest Wisconsin, 28% of all respondents currently use a burn barrel or other device to burn household garbage or other materials (Zenith Research Group, 2000). In this study, 45% of respondents indicated that convenience was the primary reason for burning garbage, and the primary material burned was paper.

There is currently no federal legislation that addresses open barrel or backyard trash burning. Various state, local, and tribal regulations govern the practice, but enforcement may be a low priority.

Long Range Transport

Long range atmospheric transport and deposition of HCB contributes to local HCB contamination. HCB has an estimated atmospheric half-life of 2.6 years (Brubaker and Hites, 1998). The relative contribution of long-range sources varies depending on several factors. Cohen et al. (1995) found that the relative contribution of different sources to the deposition of HCB in the Great Lakes was dependent upon proximity of the sources to the Great Lakes, weather patterns (e.g., the prevailing wind direction), and the level of activity associated with the emission source. For example, in this study, which estimated the relative effects of HCB sources to the Great Lakes using a computer modeling program, the largest source of HCB emissions from pesticide application was the Province of Ontario, followed by Texas, Michigan, Georgia, Illinois, and California. The contribution from Ontario was due to its proximity to the Great Lakes as well as the abundant use of HCB-containing pesticides in this province. Contributions from states relatively distant from the Great Lakes result, in part, from their high-level use of HCB-containing pesticides.

There is evidence that HCB is distributed globally, as supported by concentrations of HCB found in the Arctic, away from any sources of HCB, and by similar concentrations of HCB in air over regions as far apart as Norway, the Great Lakes, and Bermuda (Cohen et al., 1995). More research on long-range transport modeling of HCB is needed to gain a better understanding of the contribution from long-range transport and deposition.

5.2.3 Water

HCB releases to water include direct point source discharges to water bodies as well as contamination via agricultural runoff from the use of pesticides containing HCB. Due to its hydrophobic nature, HCB in applied pesticides will tend to bind to soils and sediments, rather than persist in surface water and ground water. TRI reports indicate that pesticide and chlor-alkali production facilities periodically discharge HCB to local water bodies. In 1997, 250 lbs of HCB water releases were reported to TRI by the alkalies and chlorine sector and 26 lbs by the agricultural chemicals sector, while only 4 lbs of HCB water releases were reported to TRI in 1998.

5.2.4 Sediment

EPA's 1998 report *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States* describes contaminated sediments in the U.S., assesses the probability of associated adverse effects on humans and environmental health, and identifies probable point source contributors of sediment pollutants. The report indicates that atmospheric deposition, industrial discharges, municipal discharges, and urban sources are ongoing sources contributing to organic chemical sediment contamination. The top industrial point source categories contributing to potential sediment quality problems for HCB, assessed from 1994 PCS and 1993 TRI data, are industrial organic and inorganic chemicals, pesticides, plastic materials and synthetics, and sewage systems.

Data collected at historically contaminated sites in the Great Lakes region over the last 10 to 20 years have shown decreasing concentrations of HCB. A decrease of approximately 57 percent was found in HCB levels in suspended solids from the mouth of the Niagara River over the period 1989-1996 (Niagara River Interpretation Group, 1992-1998, as presented in Benazon, 1999). The decreasing trends in the Great Lakes are likely the result of the elimination of major sources of release in the region.

Legacy emissions, or residual amounts of HCB already in the environment, may contribute to current cycling of HCB through the environment. Concentrations of HCB at legacy contaminated sediment sites vary from low levels in relatively pristine areas to high concentrations in areas used for disposal of HCB wastes. Reports of HCB concentrations from the early 1980s show an average concentration of HCB in marine sediment samples from an industrialized harbor area of Portland, Maine, of 0.14 ppb. A mean HCB concentration of 0.49 ppb was found in sediment collected near industrial areas of West Galveston Bay, Texas. Concentrations of HCB in sediment from the Niagara River watershed near several hazardous waste disposal areas were reported as 8,000 to 30,000 ppb in the early 1980s (ATSDR, 1999). HCB is a contaminant of concern at 44 hazardous waste sites currently on the EPA Superfund Program's final National Priority List (NPL) (http://www.epa.gov/ superfund/sites/index.htm). HCB is also a contaminant in soil and sediment at several uncontrolled hazardous waste sites in Texas and Louisiana (ATSDR, 1999).

5.2.5 Land Releases and Hazardous Wastes

Current releases of HCB to soil may include land disposal of HCB wastes and the use of currently registered pesticides containing residue levels of HCB. Chlorination processes produce HCB-containing tars and wastes in chlor-alkali, chlorinated solvents, semiconductor, and pesticide manufacturing sectors. Past methods of disposal of these wastes have included incineration, discharge to municipal sewage treatment plants, and landfill disposal. High-temperature incineration (around 1300 °C) with a retention time of 0.25 seconds is the recommended method of disposal for HCB because of the greater than 99% destruction efficiency (ATSDR, 1999). However, varying conditions of high-temperature incineration can also produce other toxic chlorinated compounds.

Table 2 presents the quantities of HCB waste under waste management reported to TRI in 1997 and 1998. This includes wastes treated on-site and wastes transferred off-site for disposal. In 1998, 1.8 million pounds of HCB wastes were reported under waste management by facilities reporting to TRI. Although minor amounts of fugitive HCB air releases or stack releases may be emitted when these wastes are treated or incinerated, the quantity of HCB waste reported does not represent release to the environment.

Table 2. HCB Wastes (pounds) Reported to TRI in 1997 and 1998

Industrial Sector	SIC Code	HCB Wastes (pounds)	
		1997	1998
Alkalies & Chlorine	2812	1,591,252	1,470,033
Agricultural Chemicals, nec[(a)]	2879	18,817	18,803
Cyclic Crude & Intermediates	2865	65,986	145,293
Industrial Organic Chemicals, nec[(a)]	2869	13,014	83,383
Cement, Hydraulic	3241	20,000	17,000
Refuse Systems	4953	NR	86,720
TOTAL		1,709,069	1,821,232

(a) nec = not elsewhere classified

If not properly managed, landfills are a potential source of HCB release to the environment. This has been most apparent in the HCB releases to the St. Clair River from the Dow Chemical Scott Road landfill in Sarnia, Ontario. In recent years, Dow has taken measures to remediate this landfill and minimize the release of contaminants. It is not known the degree to which other landfills, previously used to dispose of HCB wastes from the chlor-alkali, chlorinated solvent, or pesticide industries, may be in similar need of remediation. EPA is currently investigating the presence of several Level 1 chemicals in landfill leachate (Cummings, 1999).

Waste streams containing HCB may be identified by the hazardous waste codes used to regulate them. HCB is a hazardous waste regulated under the Resource Conservation and Recovery Act (RCRA). RCRA has prepared a crosswalk document that provides a means of identifying the RCRA hazardous waste streams that may contain specific chemicals. The crosswalk includes associations between approximately 500 chemicals, including HCB, and 600 RCRA hazardous waste codes (USEPA, 1998b). This document can be found on the EPA website at http://www.epa.gov/epaoswer/hazwaste/minimize/chemlist/crosswk.pdf.

Aluminum Plasma Etching

Under production conditions, the wastes from aluminum plasma etching using chlorine-containing etchants were found to contain HCB, among other chlorinated organic compounds (Schmidt et al., 1995). Aluminum plasma etching is performed in the production of microchips and other electronic components in the semiconductor industry. Potential HCB release from this process has not been evaluated.

5.3 SOURCE/SECTOR LINKS WITH OTHER CHEMICALS

Potential source and sector links between HCB and other Level 1 chemicals are listed in Table 3. Since the formation mechanisms of several of these compounds are similar, controlling one chemical may incidentally control others. Thus, Table 3 identifies sources or sectors where there is potential to couple HCB emissions reduction efforts with emission reduction efforts aimed at other Level 1 substances.

Table 3. Potential Source/Sector Links with Other Chemicals

Source/Sector	Process	Other Level 1 Chemicals	Other Toxic Chemicals
Chlor-alkali	Chlorine production	mercury, OCS, PCBs	PAHs, antimony, chromium, hexachlorobutadiene, chlorobenzenes
Incinerators	Waste incineration	mercury, dioxin, PCBs, B(a)P	PAHs
Portland cement kilns	Waste combustion	mercury, dioxin, B(a)P	PAHs
Semiconductor (microchip) manufacture	Aluminum plasma etching	OCS	hexachlorobutadiene

6.0 EPA'S PROGRAMMATIC BASELINE

6.1 OVERVIEW OF CURRENT REGULATIONS AND PROGRAMS

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), regulates registration and use of commercially produced substances created for the purpose of pest control. FIFRA requires all pesticides sold or distributed in the U.S. (including imported pesticides) to be registered by EPA. Under FIFRA (40 CFR Subchapter E), HCB was voluntarily canceled for use as a pesticide in 1984. Cancellation of a pesticide imposes a date when sale and distribution may no longer take place (usually 18 months from the effective date of cancellation), but allows for the use of existing stocks.

Because HCB has been canceled for use as a pesticide and is not a naturally occurring compound, the major regulations currently controlling its release are those governing its generation as an impurity in the pesticide industry. In addition, releases of HCB are required to be reported by certain manufacturing facilities to EPA's Toxics Release Inventory System.

Emissions limits based on "maximum achievable control technology" (MACT) have been established for municipal waste combustion units and medical waste incinerators to address chemical, and other organic pollutant, emissions. Similarly, regulations have been promulgated to control hazardous air pollutant emissions from incinerators, cement kilns, and lightweight aggregate kilns that burn hazardous waste. These standards are expected to reduce HCB emissions from municipal and medical waste incinerators and incinerators, cement kilns, and lightweight aggregate kilns burning hazardous waste.

MACT standards are being developed for chlorine production, POTW emissions, refuse systems, miscellaneous metal parts & products (surface coating), hydrochloric acid production, and Portland cement manufacturing. The anticipated effects of these MACT standards on HCB emissions have not been determined.

EPA is currently developing national emission standards for hazardous air pollutants (NESHAP) for the metal can manufacturing–surface coating source category. EPA is required to publish final emission standards for the metal can manufacturing–surface coating source category by November 15, 2000.

Table 4 provides an overview of HCB regulations under the Clean Air Act (CAA), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERLA), as well as current programs targeting HCB.

Table 4. Current Regulations and Programs

Current Standards and Regulations					
CAA	**CWA**	**SDWA**	**RCRA**	**EPCRA (SARA Title III)**	**CERCLA**
§112(b): Designated a HAP; Major source categories identified under §112(c)(6); NESHAPS established for SOCMI (40CFR 63.100); other MACT standards to be promulgated. Air toxic standards for pesticide active ingredients (62FR 60566)	CWA Priority: Listed priority pollutant (40CFR 423); subject to NPDES effluent limitations under §304(b) (40CFR 122) and general pretreatment (40CFR 403)	NPDWR / MCL: 0.001 mg/L (enforceable) MCL goal is zero	Subtitle C: HCB-containing substances are characterized as(D032) hazardous wastes - many as F & K wastes (40CFR 261.24 and 261.32); subject to hazardous waste regulations (40CFR 261.1) HCB is also listed as a Toxic Commercial Pesticide Product (U127) (40 CFR 261.33) Universal treatment standards for HCB in waste (40CFR 268.48; some F, K, and U wastes with HCB as a regulated treatment performance constituent prior to disposal can be found in CFR 268.40)	§304: Requires that facilities report CERCLA releases to state and local emergency responders §313: Releases (by facilities with 10 or more employees and that process 25,000 lbs., or otherwise use 10,000 lbs.) must be reported to TRI (40CFR 372.65). Oct. 29, 1999 Federal Register amendment to lower the TRI reporting threshold to 10 lbs. per year (40CFR 372) §311/312: If facilities have at any one time during a year over 10,000 lbs of a chemical for which OSHA requires an MSDS, the facility must submit copies of the MSDS and an annual inventory form to the fire department, and to local and state emergency responders	§103: Spills of HCB >10 lbs. must be reported to the National Response Center

Policy and Programs

- Binational Toxics Strategy Level 1 substance
- International Joint Commission (IJC) Critical Pollutant
- Bioaccumulative Chemical of Concern (BCC) under the Great Lakes Water Quality Guidance
- Tier I chemical under the Canada-Ontario Agreement
- Recognized pollutant in Lake Ontario and Lake Superior Lakewide Management Plans (LaMPs)
- Targeted in Remedial Action Plans (RAPs): Effort by IJC, EPA and other groups to restore beneficial uses to Areas of Concern (AOCs) in the Great Lakes
- Persistent Organic Pollutant (POP) by Commission for Environmental Cooperation (CEC) Council Resolution #95-5
- Included in the UN ECE Convention on Long-Range Transboundary Air Pollution (LRTAP) protocol on POPs
- Approved for a CEC North American Regional Action Plan (NARAP) under the Sound Management of Chemicals Program (SMOC)
- Monitored by the Integrated Atmospheric Deposition Network (IADN)
- Included in CAA §112(m) program, Atmospheric Deposition to Great Lakes and Coastal Waters
- Included in National Study of Chemical Residues in Fish
- Monitored in National Health and Nutrition Examination Surveys (NHANES)
- Targeted analyte in National Oceanic and Atmospheric Administration (NOAA) Mussel Watch Program
- Included in and monitored under the Arctic Monitoring and Assessment Program (AMAP)

CAA: Clean Air Act
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
CWA: Clean Water Act
EPCRA (SARA Title III): Emergency Planning and Community Right-to-know Act/Superfund Amendment Reauthorization Act
HAP: Hazardous Air Pollutant
MCL: Maximum Contaminant Level (drinking water standard)
MSDS: Materials Safety and Data Sheet
NESHAPS: National Emissions Standards for Hazardous Air Pollutants (HAPs)
NPDES: National Pollutant Discharge Elimination System
NPDWR: National Primary Drinking Water Regulations
OSHA: Occupational Safety and Health Administration
RCRA: Resource Conservation and Recovery Act
SDWA: Safe Drinking Water Act
SOCMI: Synthetic Organic Chemical Manufacturing Industry
TRI: Toxics Release Inventory

6.2 BASELINE ACTIVITIES

HCB is targeted under a number of non-regulatory programs that aim to reduce its use or release to various media. These programs are described below.

6.2.1 Air Emissions

Binational Toxics Strategy. HCB has been targeted for reduction as a Level 1 substance in the *Great Lakes Binational Toxics Strategy: Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes*. The Great Lakes Binational Toxics Strategy (BNS) provides an established process for engaging stakeholders and seeking voluntary reduction efforts. Implementation of the BNS offers an opportunity for the Agency to integrate and coordinate work toward the virtual elimination of HCB in the Great Lakes. An additional challenge of the Binational Toxics Strategy is to assess atmospheric inputs of strategy substances to the Great Lakes and, if long-range sources are confirmed, to work within international frameworks to reduce releases of such substances.

Green Thumb Project and Alternative Pest Management Programs. Initiated through the Lake Superior Binational Program, the Green Thumb Project is a pollution prevention program in Superior, Wisconsin, that demonstrates alternate lawn and turf management practices, focusing on community outreach to assist homeowners, businesses, schools, and other groups, in phasing out the use of pesticides or chemical fertilizers. Similarly, groups such as the World Wildlife Fund have teamed up with growers associations to substitute environmentally sound pest management practices for the use of high-risk pesticides that may contain HCB impurities.

Pesticide Clean Sweeps. States, particularly Great Lakes states, have initiated waste pesticide collection and disposal programs. The primary pesticides targeted for Great Lakes Clean Sweeps are the Level 1 pesticides aldrin/dieldrin, chlordane, DDT, mirex, and toxaphene. Although pesticide uses for HCB were canceled in 1984 and remaining stocks were allowed to be used, data from Minnesota Clean Sweeps have indicated that unused stocks of HCB have been collected in that state in recent years.

International Initiatives. HCB is recognized internationally as a global toxic pollutant. As a global pollutant of concern, it is listed in several multi-lateral international agreements developed to control and reduce persistent, bioaccumulative, toxic substances. International initiatives in which the U.S. is participating include the following:

- United Nations' Economic Commission for Europe Protocol on Persistent Organic Pollutants (POPs) under the Convention on the Long Range Transboundary Air Pollution (LRTAP). Pursuant to the LRTAP POPs protocol concluded and signed in June 1998, signatories have committed to eliminate discharges, emissions, and losses of POPs, including HCB. The protocol will enter into force once it has been ratified by 16 parties. As of July, 2000, the LRTAP protocol had been signed but not ratified by the U.S.

- # UNEP Global Treaty on Persistent Organic Pollutants (POPs). In July 1998, the United Nations Environment Program (UNEP) convened the Intergovernmental Negotiating Committee (INC) in Montreal, Canada, to prepare a legally-binding instrument for implementing international action on an initial list of twelve POPs, including HCB. The INC consists of representatives from UNEP, along with representatives from over 100 countries and other relevant international organizations. Much of the treaty text currently remains under negotiation. The treaty is scheduled to be signed in Stockholm in May of 2001.

- # North American Agreement for Environmental Cooperation. As part of the North American Agreement on Environmental Cooperation administered by the Commission for Environmental Cooperation (CEC), the Sound Management of Chemicals Program (SMOC) recently approved the nomination of HCB for the development of a North American Regional Action Plan (NARAP). The NARAP will identify strategies and key actions for Canada, the United States, and Mexico to effectively assess, control, and reduce HCB emissions in North America.

- # Arctic Monitoring and Assessment Program (AMAP). HCB is also recognized as one of the POPs in need of greater monitoring and control in the Arctic, largely because of its accumulation in subsistence foods of native people. AMAP was established in 1991 to implement components of the Arctic Environmental Protection Strategy (AEPS) adopted by eight Arctic countries including the United States. In support of AMAP recommendations to assess health impacts of POPs and heavy metals in the region, EPA and the Indian Health Service are jointly supporting a project to monitor selected heavy metals and POPs, including HCB, in umbilical cord blood and maternal blood of indigenous groups in Alaska. The results are expected to (1) help native populations devise strategies to maintain their traditional diet while reducing exposure, (2) help monitor spatial and temporal pollutant accumulation, and (3) improve understanding of maternal-infant health effects of contaminants.

6.2.2 Water Releases

The Clean Water Act (CWA) regulates discharges to surface waters with the overall goal to restore and maintain the chemical, physical, and biological integrity of the nation's surface waters. To control point source discharges, the CWA established the National Pollution Discharge Elimination System (NPDES) permit program, which defines the conditions and effluent limitations under which a facility may make a discharge. The NPDES permit is the regulatory tool translating the general standards (CWA, Subchapter III) into effluent limitations and monitoring requirements applicable to specific point source polluters. Indirect discharges via municipal wastewater treatment plants or sewage treatment plants must meet pre-treatment requirements, including categorical standards developed by the EPA that apply to each industry and local standards developed by each publicly owned treatment work (POTW). Effluent guidelines regulations for both direct discharges and pre-treatment standards are generally sector specific, for example for a particular segment of industry. To address the risk of contaminated runoff, NPDES storm water permits are also required for any storm water discharge associated with industrial activity, a large or medium municipal storm sewer system, or a discharge which EPA or the State determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

The Safe Drinking Water Act (SDWA) was established by Congress in 1974 to protect human health from contaminants in drinking water, and to prevent contamination of existing groundwater supplies. The SDWA National Primary Drinking Water Standards define enforceable maximum contaminant levels (MCLs), in addition to non-enforceable maximum contaminant level goals (MCLGs). The maximum contaminant level for HCB is 0.001 mg/L (1 ppb), and the maximum contaminant level goal is zero.

Recent work on toxic chemical reduction efforts for wastewater treatment plants may form the basis of comprehensive POTW pollution prevention programs. The Michigan Department of Environmental Quality, through a grant issued by the U.S. Environmental Protection Agency Great Lakes National Program Office, developed a pollution prevention training module for industrial and municipal wastewater treatment plant operators. The written course materials address pollutants of concern in the Lake Superior basin (including HCB), the impact of pollutants on wastewater treatment plant operations, and pollution prevention practices that reduce or eliminate the generation of these substances. The training materials are available on the Internet at http://www.deq.state.mi.us/ead/potw/.

Using a grant from the U.S. Environmental Protection Agency Great Lakes National Program Office, the Western Lake Superior Sanitary District (WLSSD) in Superior, Wisconsin worked with four pilot communities to develop and implement community toxic reduction plans. As part of this project, WLSSD developed a short presentation for wastewater treatment plant managers and operators on the regulatory need to reduce toxics in POTW discharge and the advantages of pollution prevention. Results of the project include written reports of the toxic reduction plans developed for each of the four pilot communities. More information concerning the four pilot community plans may be obtained from WLSSD at (218) 722-3336.

6.2.3 Sediment Contamination

Contaminated Sediment Management Strategy. The Office of Water's Contaminated Sediment Management Strategy utilizes a cross-program policy framework to promote consideration and reduction of ecological and human health risks posed by sediment contamination. The strategy advocates cross-program coordination, as well as a watershed approach, to prevent and remediate existing sediment contamination and to prevent future contamination. Actions required to manage legacy contaminated sediment sites as well as sites with existing discharges, include source control, pollution prevention, and remediation. EPA has established four goals to guide future efforts to manage contaminated sediment: 1) prevent the volume of contaminated sediment from increasing; 2) reduce the volume of existing contaminated sediment; 3) ensure that sediment dredging and dredged material disposal are managed in an environmentally sound manner; and, 4) develop scientifically sound sediment management methods. EPA's Contaminated Sediment Management Strategy (EPA-823-R-98-001), published in April 1998 to help the nation achieve these goals, is available on the Internet at http://www.epa.gov/OST/cs/manage/stratndx.html. The Agency's CERCLA and RCRA programs manage current and abandoned contaminated industrial sites.

National Sediment Database. The Office of Water (OW) and the Office of Science and Technology (OST) maintain a national sediment database and submit a biennial National Sediment Quality Survey report to Congress on the status of contaminated sediments nationwide. The database does not specifically track the progress of clean-up and/or removal of contaminated sediments, but does include data on HCB-contaminated sediment and discusses probable point source contributors. The next National Sediment Quality Survey Report to Congress is scheduled for completion in 2001. More information on the National sediments database is available on the Internet at http://www.epa.gov/OST/cs/congress.html.

6.2.4 Land Contamination

The Resource Conservation and Recovery Act (RCRA) establishes a regulatory structure for the handling, storage, treatment, and disposal of solid and hazardous wastes. Subtitle C of RCRA addresses "cradle-to-grave" requirements for hazardous waste from the point of generation to disposal. A solid waste containing HCB may become characterized as a hazardous waste when subjected to testing for toxicity as stipulated in 40 CFR 261.24, and if so characterized, must be managed as a hazardous waste. As stipulated in 40 CFR 261.33, when HCB, as a commercial chemical product or manufacturing chemical intermediate or an off-specification commercial chemical product or a manufacturing chemical intermediate, becomes a waste, it must be managed according to Federal and/or State hazardous waste regulations. Also defined as a hazardous waste is any residue, contaminated soil, water, or other debris resulting from the cleanup of a spill, into water or on dry land, of this waste. Generators of small quantities of this waste may qualify for partial exclusion from hazardous waste regulations (40 CFR 261.5).

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or Superfund, establishes a list of hazardous substances which are subject to release reporting regulations. Releases of CERCLA listed hazardous substances, if occurring in amounts exceeding a predefined "reportable quantity" (RQ), must immediately be reported to the National Response Center. Persons in charge of vessels or facilities are required to notify the National Response Center (NRC) immediately, when there is a release of this designated hazardous substance, in an amount equal to or greater than its reportable quantity of 10 lb

(4.54 kg). (The requirement applies to releases into any media, including air and water in addition to land.)

6.2.5 Exposure Reduction

National Health and Nutrition Examination Surveys (NHANES). Conducted by the Centers for Disease Control and Prevention's (CDC's) National Center for Health Statistics, NHANES traces the health and nutritional status of U.S. civilians. Working with the CDC, EPA will use NHANES to measure and track human exposure to HCB. It is recommended that the results of NHANES be used to determine whether research is needed on pathways of human exposure to HCB.

6.2.6 Measurement

Integrated Atmospheric Deposition Network. The Integrated Atmospheric Deposition Network (IADN) determines the atmospheric loadings of toxic substances to the Great Lakes system and defines temporal (1990 to present) and spatial trends. With one master station on each of the five Great Lakes and 14 satellite stations, IADN currently monitors the atmospheric deposition of HCB, among other toxic chemicals. Additional information on the IADN programs is available on the Internet at http://airquality.tor.ec.gc.ca/natchem/particle/ networks/iadn.html.

National Study of Chemical Residues in Fish. Conducted by EPA's Office of Water, this national fish study will statistically evaluate the incidence and severity of Level 1 substances, including HCB, in fish tissue. EPA has already developed a study design for the fish survey. Fish will be collected from lakes and reservoirs on a national basis, during the time period from 1999 through 2003, and will allow for estimating trends over time. The National Study of Chemical Residues in Fish does not currently include Alaska. Expanding the fish tissue study to Alaska would provide important information on exposure levels and health risks for sensitive subpopulations in the Arctic region, and may also provide important information regarding long range transport. EPA is considering the need to conduct additional sampling of fish tissue in Alaska as part of the National Study of Chemical Residues in Fish.

National Oceanic and Atmospheric Administration's Mussel Watch Project. The National Oceanic and Atmospheric Administration's (NOAA) Mussel Watch Project has been conducting measurements of contaminants in mussel and oyster tissues since 1986 to evaluate the status and trends in contaminant levels in the nation's Great Lakes, estuarine, and marine waters. Sites are visited approximately biennially for collection of animals to be analyzed for a suite of over 70 contaminants, including HCB.

Information Collected from POTWs and Community Fire Departments. Depending on the size of a POTW, and the jurisdiction in which it is located, the facility may monitor for HCB and may have pre-treatment requirements for dischargers to its facility. Section 312 of the Emergency Planning and Community Right to Know Act (EPCRA) requires that facilities annually submit inventory information on certain hazardous chemicals to their local fire departments as well as to the local and state emergency response authorities. In the case of HCB, facilities must submit inventory information if at any time during the year they have at the facility

10,000 pounds or more of HCB. (EPCRA Sections 311 and 312 do not apply to RCRA waste under regulation.) Fire departments would have information on HCB in use or storage at local facilities that have HCB present in such quantities.

Alaska Cord Blood Project. OIA, in partnership with the Indian Health Service and other Alaskan organizations, is supporting a project to investigate the relationship between contaminant exposure in native women in Alaska and infant health. The project involves monitoring levels of selected persistent organic pollutants, including HCB, in umbilical cord blood and maternal blood from individuals representing two primary indigenous groups in northern Alaska. A total of 180 specimen pairs will be collected and analyzed. A yearly report that incorporates data from dietary surveys and measured contaminant levels from the cord blood study will be developed for distribution to collaborating agencies and Alaskan natives. The report will also include an examination of significant relationships between any pollutant, or combination of pollutants, and maternal age, diet, obstetric history, complications of pregnancy, newborn measurements, abnormal infant development, malformations or serious infections.

7.0 PROPOSED GOALS AND ACTIONS

7.1 EPA'S ASSESSMENT AND STRATEGIC APPROACH

As the risks to human health and the environment from HCB became clear, releases of HCB to the environment were dramatically curtailed, primarily through reductions in its use as a pesticide and a pesticide by-product. Current sources of release still exist, but there are information gaps related to the magnitude of known and suspected sources of HCB, the extent of pollution resulting from long-range transport, and the content of HCB in sinks such as sediments and POTW sludge that may contribute to environmental cycling within U.S. boundaries. Therefore, the strategic approach of the Agency will involve voluntary initiatives to effect reductions and minimize media transfers, information collection to verify sources and sinks, and increased involvement and assistance with international groups and other countries to reduce atmospheric deposition in the U.S. The strategic approach of the Agency will focus on the following three areas:

1. The identification and implementation of voluntary initiatives and outreach opportunities to reduce releases of and exposure to HCB, while minimizing controlled and uncontrolled (e.g., volatilization from water to air, deposition onto soil or plants) multi-media transfers.

2. Continued information collection and integration of data across media regarding sources, sinks, releases, environmental trends, and human food and tissue levels for HCB. Data collection will occur through Binational Toxics Strategy (BNS) efforts, MACT standard development, various EPA permitting and reporting processes, and industry involvement.

3. Collaborate (or partner) with international organizations and foreign governments to assess the significance of long-range transport from other countries and to foster the proliferation of pollution prevention or control technology measures that will reduce inputs of HCB to the environment.

7.1.1 Data Gaps

As discussed in Section 4.0, the Great Lakes and Gulf coast appear to be those areas in the U.S. with highest HCB contamination. While the general population may be exposed to low levels of HCB from various foods, people living near HCB-contaminated hazardous waste sites, recreational and subsistence fishermen, and native populations potentially incur higher exposures. The limited amount of data characterizing HCB levels in the environment, in fish and wild game species, and in consumer products, hinders the ability to identify other potentially sensitive subpopulations and geographic areas.

Additional data gaps reflect the lack of information concerning emissions/releases from sources of HCB. As discussed in Section 5.2.2, ferric chloride used for wastewater treatment may contain HCB. The level of HCB in ferric chloride, and its source, have not been confirmed. HCB emissions from pesticide application may vary significantly from estimated emissions, depending on the pesticide HCB level and the rate of volatilization of HCB used in the calculation. Section 5.2.5 notes the uncertainty regarding potential HCB release to the environment from wastes generated during the production of microchips by aluminum plasma etching. HCB is also a potential byproduct of chlorinated waste combustion, though HCB emission estimates have not been confirmed.

Small sources of HCB may exist. Pure HCB may be bought from specialty chemical manufacturers, e.g., laboratory reagent suppliers and manufacturers. However, the volume being manufactured and sold, and the purposes for which it is purchased, are not known. In addition, HCB was once imported for use as a dye in fireworks.

Other uncertainties regarding sources of HCB are the potential for HCB in consumer products (e.g., textiles, synthetic rubber, paints) and the potential for indoor residential exposure, the fate of potentially contaminated products in municipal landfills, and the levels of HCB in POTW sludges that are land-applied. These may contribute to regional and national levels in air, runoff, and surface waters and sediment–all of which ultimately contribute to some level of HCB in the food chain.

In 1999 and previous years, only manufacturing facilities (SIC codes 20 - 39) which had ten or more employees and that met reporting thresholds (manufacture or process 25,000 pounds or otherwise use 10,000 pounds of a listed chemical) were required to report transfers and releases of HCB. Electric utilities did not fall into the SIC code range covered by TRI. However, under an amendment to TRI published in the Federal Register as a final rule on October 29, 1999, the reporting threshold for HCB was lowered to 10 pounds to capture smaller, less visible and/or less well-regulated sources that may be emitting HCB. Also, under this rule, utilities (e.g., SIC codes 4911, 4931, 4939) are subject to TRI requirements. If affected facilities do not test their effluent, they are required to develop a reasonable estimate, based on available data, for reporting to TRI. The new rule becomes effective with the January 1, 2000 reporting year, and data collected under the new requirements will likely be available in 2002.

Through NPDES, facilities disclose water discharges that are known. Under NPDES, permitted facilities are required to report direct discharges of HCB to surface waters once a year and indirect discharges twice a year; only facilities for which HCB is a regulated constituent are required to report releases to NPDES. Unregulated facilities may represent a data gap in effluent discharges that can only be inferred far downstream via sediment, bivalve, and fish sampling.

Although there is evidence that HCB is distributed globally, as indicated by detections of HCB in arctic environmental media, little research has been done on long-range transport of HCB. More research on long-range transport modeling of HCB is needed to gain a better understanding of the impact of distant sources on HCB loadings in the U.S.

7.1.2 Stakeholder Issues/Concerns

A key concern of U.S. industry is the extent of the contribution of international sources to levels of HCB in the environment in the U.S. Industry is concerned that without knowledge of the magnitude of HCB originating outside of the U.S., this contamination may be attributed to domestic sources.

7.1.3 Opportunities for Integration with Work on Other PBTs

As shown in Table 3, HCB may share several source sectors with other Level 1 chemicals. These overlapping Level 1 chemical source sectors may provide EPA with opportunities to realize efficiencies from actions directed at other PBT pollutants. For example, combustion controls for incinerators and cement kilns targeted at other chemicals may simultaneously reduce HCB emissions.

7.1.4 Key Players and Roles

The key Agency offices will be OIA, OAR, OAQPS, GLNPO, OSW, OPP, OPPT, ORD, OW, and the Regions. Primary non-Agency stakeholders in this effort may include States, Tribes, industry representatives from known or suspected sources, environmental groups such as the National Wildlife Federation and World Wildlife Fund, and international committees. EPA anticipates that each of these groups, and others, will play a role in reducing the use, release, and exposure to HCB compounds. For instance, State agricultural agencies and appropriate agricultural stakeholders may be interested in voluntary collections of pesticides that contain HCB. Funding allocations for HCB reduction actions have not been determined. However, States are encouraged to seek funding for actions that they would like to include in their State programs. Information on EPA grants and funding opportunities is available at http://www.epa.gov/ogd/grants.htm.

7.2 GOALS

The goal of the PBT Strategy, to identify and further reduce risks to human health and the environment from existing and future exposure to PBTs, is the guiding principle in the development of the strategic approaches for HCB in this action plan. In addition, this action plan supports several goals outlined in EPA's 1997 Five Year Strategic Plan. As required under the Government Performance and Results Act of 1993 (GPRA), EPA's Strategic Plan describes EPA's mission and sets forth ten major goals that serve as the framework for the Agency's planning and resource allocation decisions. These ten goals apply to all of EPA's programs and projects and, therefore, clearly encompass many goals, targets and programs that do not apply to HCB. There are, however, several GPRA goals and sub-objectives that do call for programs promoting reductions in the environmental presence of all toxics of concern, and thus effectively contribute to the desired outcome of HCB exposure risk reduction. These broader GPRA goals that are relevant to HCB and the associated strategy described in this report are listed in Appendix A.[1]

In addition to the GPRA goals, the Agency has identified the following goals to specifically identify and reduce risks from current and future exposure to HCB:

1. By 2005[2], collect information to characterize sources and pathways in the lifecycle of HCB, including storage and disposal practices, product contamination, and air and water releases from industrial and/or residential sources.
2. By 2010, achieve a significant reduction in total air emissions from inventory sources of HCB, using 1993 HCB levels. By 2002, the reduction goal will be reevaluated (to determine whether a percent reduction goal can be specified) based on information collected to characterize releases, the identification of the availability and effectiveness of control technology, and the initiation of partnerships.
3. Minimize controlled and uncontrolled multi-media transfers of HCB.
4. Determine the extent of HCB contamination from long-range transport and work within international frameworks to reduce releases of HCB worldwide.

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[1]Revised GPRA goals have been released in draft form in EPA's *Draft 2000 Strategic Plan*. The GPRA goals in Appendix A will be updated when the revised goals become final.

[2] Data will also be gathered as they become available (e.g., updates to the National Toxics Inventory, TRI reports, results of the National Fish Study and NHANES).

7.3 FUTURE DIRECTION AND ACTIVITIES

Several key actions are proposed to achieve the goals for HCB, as summarized in Table 5 below.

Table 5. Strategic Approach, Key Actions, and Key Players in the Reduction of HCB

Strategic Approach		
Focus	**Key Actions**	**Key Players & Stakeholders**
1. Identify and implement voluntary initiatives and outreach opportunities, while minimizing multi-media transfers	– Source Reduction Techniques – Industry Partnerships – Outreach/Education – POTW Pollution Prevention Programs	– GLNPO, OSW, OW, ORD, Regions, States, Tribes, Industry stakeholders, Community groups, POTWs
2. Continue to collect information and integrate data across media regarding sources, sinks, releases, environmental trends, food and body burden levels	– Identify local or regional hot spots (IADN, National Study of Chemical Residues in Fish, NHANES, NOAA Mussel Watch) – Review current lists and existing data – Quantify reductions achieved through MACT standards promulgated for other substances – Research potential for HCB contamination in consumer products	– OW, OSW, OAQPS, ORD, GLNPO, OPPT, States, Tribes, Community groups
3. Work with international organizations to assess the significance of long-range transport from other countries and to foster the proliferation of P2 or control technology measures	– Continue current international efforts (BNS, CEC/SMOC, LRTAP, UNEP, AMAP) – Assess the significance of long range transport from other countries and identify countries with opportunities to reduce HCB emissions	– OIA, OAR, ORD, OPPTS, GLNPO, States, Tribes, Community groups

The key actions are described in the following sections and are listed in order of priority in Appendix A. Actions with the potential to directly effect reductions in HCB are given higher priority than actions that characterize sources, releases, or environmental hot spots but that, in and of themselves, do not lower HCB emissions. Additional criteria considered in prioritizing actions included actions that emphasize pollution prevention, build on international efforts, affect more than one PBT or media, offer cost-effective risk reduction, protect vulnerable subpopulations, support GPRA goals, or are based on sound science.

7.3.1 Products

EPA is considering the need to examine the potential for HCB in household and consumer products, the potential for exposure from use of these products, and the fate of these products in municipal landfills. Consumer products containing HCB should be identified, and the use of HCB in the manufacture of household and consumer products defined.

7.3.2 Stakeholder Involvement

EPA considers stakeholder involvement essential to reaching the goal of the PBT Strategy. In fact, the key priority actions for this action plan rely upon stakeholder cooperation. To reduce industrial emissions of HCB, EPA intends to pursue voluntary initiatives with industry stakeholders. EPA invites comment on the draft national action plan and encourages all interested partners to join in voluntary initiatives to reduce risks to human health and the environment from exposure to HCB.

7.3.3 Air

Source Reduction Techniques. EPA will engage industry and other stakeholders in discussions about possible and practicable process changes or waste management practices that may reduce HCB releases. Through these discussions, EPA will seek to identify and implement voluntary initiatives and outreach opportunities, while minimizing multi-media transfers of HCB. EPA also recommends fostering greater use of source reduction techniques and technological alternatives among stakeholders identified through industry benchmarking studies.

Industry Partnerships. EPA will seek to form partnerships with industries in which HCB may be a process impurity or an unintended byproduct. These partnerships will attempt to reduce uncertainties, quantify HCB concentrations, and/or identify the chemical processes that generate HCB. The goal of a partnership will be to prevent the generation of HCB and to promote waste minimization/pollution prevention practices that substantially reduce the levels of HCB generated in waste streams. This may include innovative approaches to lower barriers to the development and implementation of clean technologies (e.g., non-incineration techniques for treating organic waste streams). For pesticide manufacturers, information regarding HCB levels in currently used pesticides, and usage rates of these pesticides containing HCB will be sought. Beginning with facilities identified as areas of high contamination (e.g., from fish advisories and analytical sampling studies), targeted industries will include:

- Industrial inorganic chemicals (silicone products manufacture)
- Metal can (surface coating)
- Chlor-alkali
- Refuse systems
- Hydrochloric acid production
- Pesticides manufacturing
- Semiconductor

Other industries may be contacted as more information becomes available. Potential industry partners are invited, and may be solicited, to share information with EPA that will further the goal of HCB reduction. Where voluntary efforts fail, EPA will consider requiring industry to perform testing to determine emissions/releases of HCB.

Quantify Reductions from MACT Standards for Other PBTs. MACT standards have been promulgated for large municipal waste combustion (MWC) units and proposed for small MWC units; however, facilities burning less than 35 tons per day are not currently subject to regulation. MACT standards have been promulgated for three categories of medical waste incinerators. MACT standards have also been promulgated for hazardous waste combustors. For cement kilns, MACT standards have been promulgated under the hazardous waste combustors rule and Portland cement kilns rule (for non-hazardous waste burners). The implementation of these regulations is expected to reduce HCB emissions. EPA is considering the need to compile the necessary data to determine quantitatively how MACT standards promulgated for other PBTs will concomitantly reduce emissions of HCB. This action will not only help to document the effectiveness of current regulations aimed at one or more PBT pollutants, but may also be useful in proposing future regulations that can be demonstrated to concurrently reduce the emissions of several PBT pollutants.

Review of Current Lists and Existing Data. EPA is considering the need to collect information to provide a comprehensive characterization of the potential for HCB exposure from all media. Data sources for this effort may include information gathered through MACT standard development processes, EPA permitting processes, National Toxics Inventory updates, TRI reporting, RCRA Biennial Reporting System, other federal agencies (e.g., FDA, NIOSH), state toxics monitoring programs, pesticide Clean Sweeps programs, annual implementation reports submitted by signatories to the LRTAP POPs protocol, and voluntary industry testing. Specific information to be collected includes:

- Levels of HCB in all human foods, especially high fat products such as meat, fish, eggs, and dairy products
- Sources most likely to contribute to contaminated fish and wildlife.
- The quantity and trends of HCB released to air, water and wastes (e.g., from TRI)
- The extent to which industrial HCB emissions should be reduced to contribute to reductions in HCB levels in human food and tissue (i.e., the threshold level of HCB emissions that contributes to health exposure risk)
- The rate of volatilization of HCB from pesticides application
- Whether small sources of HCB remain, the volume being manufactured and sold, and the purposes for which it is used (e.g., paints, dyes, fireworks).

Pesticide Management Programs. The presence of HCB as a trace contaminant in several currently used pesticides results in the potential for exposure. Pesticides potentially containing HCB include atrazine, simazine, dacthal (DCPA), chlorothalonil, picloram, lindane, pentachloronitrobenzene (PCNB), and pentachlorophenol (PCP). Some of these pesticides, such as DCPA and chlorothalonil, are used on lawns or gardens. EPA is considering the need to partner with States and communities to implement pollution prevention programs aimed at reducing the potential for exposure to HCB that volatilizes as result of the application of these pesticides. Programs like the Green Thumb Project educate and encourage consumers and growers associations to adopt alternative practices to the use of chemical pesticides.

Long-Range Transport. Key EPA program offices (e.g., OAR, OPPTS, ORD, OIA) will continue current efforts to address sources and releases of HCB worldwide through participation in the following international initiatives:

- Binational Toxics Strategy (BNS). Through the BNS, EPA will evaluate and identify the contribution and significance of long-range transport of HCB from world-wide sources. Based on these evaluations, it is expected that both Canada and the U.S. will seek reductions in regional and global emissions of PBTs, including HCB, in order to protect and ensure the health and integrity of the Great Lakes ecosystem.
- Convention on Long Range Transboundary Air Pollution (LRTAP) POPs Protocol. The LRTAP POPs protocol outlines commitments to "control, reduce, and eliminate discharges, emissions and losses of persistent organic pollutants", including HCB. Although the protocol does not outline any numerical emission limits for HCB (because so far, few countries have emission inventories), it commits signatories to developing and improving emission inventories and reducing HCB emissions to baseline emission levels selected by each country. The application of limit values and best available techniques are legally binding and enforceable for both new and existing stationary sources eight years after the protocol is ratified by 16 countries.
- UNEP Global Treaty on Persistent Organic Pollutants (UNEP POPs Treaty). Through involvement in UNEP POPs Treaty negotiations, EPA will work with key government departments toward the development and signing of an international legally binding agreement on the control and reduction of POPs, including HCB. As the agreement currently stands, member countries will be required to identify and quantify emission sources for all listed POPs, develop action plans for reduction, and make information available to the general public. The treaty will incorporate capacity-building activities to aid less developed countries (LDCs) in achieving control and reduction goals. It is expected that negotiations will be completed in December 2000.
- Arctic Monitoring Assessment Program (AMAP). AMAP was established in 1991 to implement components of the Arctic Environmental Protection Strategy (AEPS) adopted by eight Arctic countries including the United States. Primary components of this strategy include monitoring the levels of, and assessing the effects of, anthropogenic pollutants in all compartments of the Arctic environment, including humans. Although the U.S. is a

AMAP member country and participates in the AMAP Working Group, data collection on human body burdens is currently still in the planning phase in U.S. territories. However, as discussed in Section 6.2.1, EPA is jointly supporting a project to assess health impacts of POPs and heavy metals in the Arctic by monitoring these pollutants in indigenous groups in Alaska. Additional information on the AMAP program is available on the Internet at http://www.grida.no/amap/.

North American Agreement on Environmental Cooperation. As part of the North American Agreement on Environmental Cooperation administered by the Commission for Environmental Cooperation (CEC), EPA will continue to support initiatives pertaining to HCB control and reduction established by the CEC's Sound Management of Chemicals Program (SMOC). For example, the EPA will work with Canadian and Mexican counterparts to develop a North American Regional Action Plan (NARAP) covering dioxins, furans and HCB, recently approved by SMOC. Where relevant, key strategies outlined for HCB reduction in this national action plan will be coordinated with overarching North American strategies and actions identified in the NARAP.

In addition, the PBTI is recommending that key EPA offices:

1. Assess the significance and relative magnitude of sources of long range transport, including, if necessary, research on long-range transport modeling of HCB.
2. Identify countries with opportunities to reduce HCB emissions; and
3. Establish partnerships with international organizations (e.g., World Bank, OECD, EU, non-government groups (NRDC, Friends of the Earth)) and foreign governments in reducing long-range transport from sources contributing to atmospheric loadings of HCB by fostering the proliferation of control technology, waste minimization, and pollution prevention opportunities.

7.3.4 Water

Publicly Owned Treatment Works (POTW) Pollution Prevention Programs. Since there are potentially many sources of HCB to POTWs, and significant resources are necessary to train and maintain staff in implementing POTW pollution prevention programs, it may be necessary that a broad array of toxic chemicals be targeted in POTW monitoring and toxic reduction efforts. Community toxic reduction programs, similar to those described in Section 6.2.2, can focus on the sources of HCB to POTW facilities, as well as other problem chemicals such as mercury, and work with waste generators to reduce toxics in the waste stream. In addition, POTWs are encouraged to test for HCB in ferric chloride used at their facilities and to purchase only ferric chloride that has de minimus levels, or non-detectable levels, of HCB. EPA will consider assessing the need for regulatory limits on the HCB content of ferric chloride.

Identification of Local or Regional Hot Spots. Through on-going soil, sediment, water, and fish monitoring programs, EPA is considering the need to identify areas where suspected sources are contributing significantly to the local environment and report and disseminate the findings.

EPA is also considering the need to form partnerships with local or regional agencies and with stakeholders to develop action plans that address these areas. The information collected can be used to measure progress toward the goals outlined in this action plan.

7.3.5 Sediments

In the process of conducting remediation activities, the Agency will give full consideration to media-transfer issues, such as the possible release of HCB to the atmosphere through volatilization, e.g., in the drying of dredged sediments, or disturbance of contaminated soils.

The Agency's strategy for addressing contaminated soils and sediments is broader than a focus on a single pollutant. Therefore, the strategy and actions for addressing HCB in soils and sediments will be part of broader Agency's efforts such as the Office of Water's Contaminated Sediment Management Strategy. Within the context of the agency-wide strategy for contaminated sediments, the Agency will also pursue other activities to streamline and expedite remediation of PBT contamination. These actions include development of guidance documents on sediment remediation and coordination of disposal approval with States.

7.3.6 Measurement

EPA will consider developing a national monitoring strategy for PBT substances. The objectives of a national monitoring strategy would be to:

- Maintain a database of PBT levels in environmental media
- Track PBT levels in raw commodities and fish consumed by the general population and selected subpopulations
- Track PBT levels in wildlife
- Characterize multi-pathway exposures
- Identify high-priority areas for PBT efforts
- Publish maps that highlight geographical areas of elevated concentrations
- Coordinate existing monitoring efforts
- Assess data gaps
- Propose additional monitoring where needed

A national monitoring strategy would also facilitate the measurement of progress toward goals established in several action plans developed under the PBT Strategy.

The PBT Strategy requires that EPA follow several guiding principles, including the use of measurable objectives and the assessment of performance. These requirements coincide with GPRA requirements for measurement of progress and reporting of accomplishments. As stated in the PBT Strategy, EPA will use the following measures to track progress in reducing risks from HCB: (1) environmental or human health indicators, (2) chemical release, waste generation, or use indicators, or (3) programmatic output measures. Table 6 presents the proposed measures of progress and corresponding GPRA goals for actions to reduce risks from HCB.

Table 6. Measures of Progress and GPRA Goals for Actions to Reduce Risks from HCB

Focus	Corresponding GPRA Goal	Action	Measure of Progress[1]
1. Identify and implement voluntary initiatives, while minimizing multi-media transfers	Goal 4 Goal 2 Goal 1 Goal 9	– Source Reduction Techniques – Industry Partnerships – Outreach/Education – POTW Pollution Prevention Programs	– Baseline inventory – Reduced reports of HCB emissions/releases – Waste minimization and P2 practices implemented
2. Continue to collect information and integrate data across media	Goal 6	– Identify local or regional hot spots (IADN, National Study of Chemical Residues in Fish, NHANES, NOAA Mussel Watch) – Review current lists and existing data – Research potential for HCB contamination in consumer products – Quantify reductions achieved through MACT standards promulgated for other substances – Maintain a dialogue with industry through BNS	– Development of local/regional action plans in areas of high exposure – Characterization of the lifecycle of HCB, trends in releases, and potential for exposure – Identification of consumer products containing HCB
3. Work with international organizations to assess the significance of long-range transport from other countries and to foster the proliferation of pollution prevention or control technology measures	Goal 8 Goal 6 Goal 4	– Continue current international efforts (BNS, CEC/SMOC, LRTAP, UNEP, AMAP) – Identify countries with opportunities to reduce HCB emissions	– Implementation of control technologies, waste minimization, and P2 opportunities – Reduction in transboundary fluxes and ambient air levels and concentrations in remote locations

[1] These are measures of progress recommended for actions in this action plan and may not correspond with Agencywide-accepted measures of progress relating to GPRA goals.

7.3.7 Budget Constraints

This action plan identifies and recommends key actions to achieve the stated goals for HCB. These actions and their relative priority are listed in the Action Planning Matrix in Appendix A. The Agency has not yet made a determination on which actions will be able to be funded.

7.3.8 Actions with Links to Other PBT Chemicals

Although the pesticide uses of HCB have been canceled since 1984, unused stocks may remain, particularly in agricultural areas. EPA recommends, in coordination with the PBT National Action Plan for Pesticides, that the collection of these stocks be promoted at pesticide clean sweeps.

Combustion and incineration sources are the primary sources for which HCB reduction may be achieved indirectly through actions directed at other Level 1 chemicals. For example, the national action plan for benzo(a)pyrene (B(a)P) proposes actions to reduce emissions from several combustion sources. These and other actions, such as MACT standards for combustion and incineration sources, are likely to reduce multiple PBT emissions, including HCB. It is important that HCB reductions be taken into account when assessing the benefits of those actions directed at other pollutants.

Due to common sources of release, OCS is another chemical with which integrating actions might prove cost effective or otherwise advantageous. One example of an action that would provide information for both HCB and OCS is sediment core sampling in selected geographic areas. Dated sediment core samples could indicate temporal trends in the concentrations of these substances as well as form a basis for engaging local sources in pollution prevention efforts.

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GLOSSARY

BNS	Binational Toxics Strategy
CAA	Clean Air Act
CEC	Commission for Environmental Cooperation
EPA	Environmental Protection Agency
EU	European Union
GLNPO	Great Lakes National Program Office
GPRA	Government Performance and Results Act of 1993
HCB	Hexachlorobenzene
IADN	Integrated Atmospheric Deposition Network
LRTAP	Long Range Transboundary Air Pollution
MACT	Maximum Achievable Control Technology
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NPL	National Priority List
NRDC	Natural Resources Defense Council
NTI	National Toxics Inventory
NWF	National Wildlife Federation
OAQPS	EPA Office of Air Quality Planning and Standards
OAR	EPA Office of Air and Radiation
OCS	Octachlorostyrene
OECA	EPA Office of Enforcement and Compliance
OECD	Organization for Economic Cooperation and Development
OIA	EPA Office of International Activities
OPPT	EPA Office of Pollution Prevention and Toxic Substances
ORD	EPA Office of Research and Development
OST	EPA Office of Science and Technology
OSW	EPA Office of Solid Waste
OW	EPA Office of Water
P2	Pollution Prevention
PBT	Persistent, Bioaccumulative, and Toxic
PBTI	Persistent, Bioaccumulative, and Toxic Pollutants Initiative
PCP	Pentachlorophenol
PCS	EPA’s Permit Compliance System
POPs	Persistent Organic Pollutants
POTW	Publicly Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
SIC	Standard Industrial Code
TRI	Toxics Release Inventory
UNEP	United Nations Environment Program

APPENDIX A

DRAFT HCB ACTION PLANNING MATRIX

Rank	Action	Lead Office	Other Potential Key Players	Status: Ongoing, Recommended or Being Considered	Expected Result
1	Source reduction techniques	GLNPO	Industry stakeholders	Ongoing	Reduced TRI releases; waste minimization; P2 practices
2	Industry partnerships	OSW	Industry stakeholders	Recommended	Reduced TRI releases; waste minimization; P2 practices
3	POTW Pollution Prevention Programs	OW	POTWs	Being Considered	Fewer waste water discharges
4	Outreach/education to consumers and growers associations	States, Regions	Community groups	Ongoing, Being Considered	Reduced exposure to HCB from pesticide application
5	Identify local or regional hot spots	OW	POTWs	Being Considered	Development of local/regional action plans in areas of high exposure
6	Review current lists and existing data	OSW, OAQPS	FDA, GLNPO	Ongoing, Being Considered	Characterization of lifecycle of HCB, trends in releases, and potential for exposure
7	Quantify reductions of HCB from MACT standards for other PBTs	OAQPS		Being Considered	Report quantitative effect on HCB of MACT standards for Level 1 source sectors
8	Research potential for exposure from HCB in consumer products	ORD, OSW		Being Considered	Identification of products containing HCB
9	Continue current international efforts	OIA	CEC, LRTAP, UNEP	Ongoing	Reductions in regional and global emissions
10	Assess the significance and relative magnitude of sources of long range transport	GLNPO, OIA		Ongoing, Recommended	
11	Identify countries with opportunities to reduce HCB emissions	GLNPO, OIA		Recommended	Sharing control technologies, waste minimization, and P2 opportunities
12	Coordinate with international organizations and other governments by fostering the proliferation of control technology, waste minimization, and pollution prevention opportunities	OIA, OPPTS, OAQPS		Ongoing, Recommended	Reduction in ambient air levels and concentrations of HCB in remote locations
13	Continue Agency efforts on contaminated sediments	OW, OERR		Ongoing	Control or remediation of contaminated sites
14	Promote the collection of HCB at pesticide Clean Sweeps		States and Regions	Ongoing	Prevention of potential release

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GPRA GOALS

The goals of this action plan are consistent with the goal of the PBT Strategy: to identify and reduce risks to human health and the environment from current and future exposure to HCB. In addition, this action plan supports several goals outlined in EPA's 1997 Five Year Strategic Plan. As required under the Government Performance and Results Act of 1993 (GPRA), EPA's Strategic Plan describes EPA's mission and sets forth ten goals that serve as the framework for the Agency's planning and resource allocation decisions. Specifically, this action plan contributes to the desired outcome of the following EPA Strategic goals. (Revised GPRA goals have been released in draft form in EPA's Draft 2000 Strategic Plan. The following GPRA goals will be updated when EPA's Draft 2000 Strategic Plan becomes final.)

Goal 1: <u>Clean Air</u>

- By 2010, reduce air toxics emissions by 75% from 1993 levels to significantly reduce the risk to Americans of cancer and other serious health effects caused by airborne toxics.

Goal 2: <u>Clean and Safe Water</u>

- By 2005, protect human health so that 95% of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced;

Goal 4: <u>Preventing Pollution and Reducing Risk in Communities, Homes, Workplaces and Ecosystems</u>

- By 2005, reduce by 25% (from 1992 levels) the quantity of toxic pollutants released, disposed of, treated, or combusted for energy recovery. Half of this reduction will be achieved through pollution prevention practices.

- By 2005, reduce the most persistent, bioaccumulative, and toxic chemicals in hazardous waste streams by 50% (as compared with a baseline year of 1991) and achieve a 25% increase in the amount of hazardous waste safely recycled, relative to the amount safely recycled in 1993.
- By 2005, public and ecosystem risk from pesticides will be reduced through migration to lower-risk pesticides and pesticide management practices, improving education of the public and at risk workers, and forming “pesticide environmental partnerships” with pesticide user groups.

Goal 5: Better Waste Management and Restoration of Contaminated Waste Sites

- By 2005, EPA and its partners will reduce or control the risk to human health and the environment at over 375,000 contaminated Superfund, RCRA, UST and brownfield sites.

Goal 6: Reduction of Global and Cross-Border Environmental Risks

- By 2005, consistent with international obligations, the need for upward harmonization of regulatory systems, and expansion of toxics release reporting, reduce the risks to U.S. human health and ecosystems from selected toxics (including pesticides) that circulate in the environment at global and regional scales.
- By 2005, reduce transboundary threats to human health and shared ecosystems in North America, including marine and Arctic environments, consistent with our bilateral and multilateral treaty obligations in these areas, as well as our trust responsibility to tribes.
- By 2005, increase the application of cleaner and more cost-effective environmental practices and technologies in the U.S. and abroad through international cooperation.

Goal 8: Sound Science, Improved Understanding of Environmental Risk and Greater Innovation to Address Environmental Problems

- Incorporate innovative approaches to environmental management into EPA programs, so that EPA and external partners achieve greater and more cost-effective public health and environmental protection.

Goal 9: A Credible Deterrent to Pollution and Greater Compliance with the Law

- Promote the regulated communities’ voluntary compliance with environmental requirements through compliance incentives and assistance programs.