Decision Document on *Hexachlorobenzene* Under the Process for Identifying Candidate Substances For Regional Action under the Sound Management of Chemicals Initiative

Prepared by the
Substance Selection Task Force of the
North American Working Group
for the Sound Management of Chemicals

Discussion Draft for Public Review and Comment
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Table of Contents

Preface

This Decision Document is the product of the third stage in the *Process for Identifying Candidate Substances for Regional Action under the Sound Management of Chemicals Initiative* (Substance Selection Process). Its objectives are to:

1. provide a recommendation to the North American Working Group for the Sound Management of Chemicals (SMOC Working Group) regarding a possible North American Regional Action Plan (NARAP) for hexachlorobenzene;
2. review the results of the Substance Selection Process for hexachlorobenzene;
3. identify issues related to major NARAP implementation considerations; and
4. provide recommendations on the possible scope of a NARAP for hexachlorobenzene.

The Substance Selection Task Force (SSTF), a subsidiary body of the SMOC Working Group, administers the Substance Selection Process. Its mandate is to review substances as possible candidates for NARAPs to be developed by the governments of Canada, the United Mexican States, and the United States of America. The SSTF consists of two members from each of these Parties and one observer each from the ENGO (environmental nongovernmental organization), industry and academic sectors.

The SMOC Working Group is the principle body responsible for administering the Sound Management of Chemicals (SMOC) initiative. The SMOC initiative and the Working Group were established by Commission for Environmental Cooperation (CEC), Council Resolution #95-5, “Sound Management of Chemicals.”

Council Resolution #95-5 was developed under the authority of the North American Agreement on Environmental Cooperation (NAAEC) and advances many of the commitments and obligations set out in the NAAEC. The Council (of Ministers) is the governing body of the Commission for Environmental Cooperation (CEC). The Commission was established as part of the North American Agreement on Environmental Cooperation. The Council of the Commission for Environmental Cooperation approved Council Resolution #95-5 on 13 October 1995, at its second regular meeting which was held in Oaxaca, Mexico.

A key focus of the SMOC initiative to-date has been the development of NARAPs for those persistent and toxic substances that the Parties agree warrant collective regional action because they pose a significant risk to human health and the North American environment. The NARAPs reflect a shared commitment by the Parties to work cooperatively to build on domestic policies and laws, to improve domestic capacities, and to bring a regional perspective to the implementation of international environmental commitments that are either in place or being negotiated to address persistent and toxic substances.

Each NARAP is necessarily unique, resulting from the need to reflect differing circumstances for each Party, including production, use, and disposal practices for substances; natural endowments, climatic and geographical conditions; and economic, technological and infrastructure capabilities. The sharing and transfer of information and best practices to enhance national capacity for the sound management of chemicals has been one common theme for NARAPs. To date, NARAPs have been established for DDT, chlordane, mercury and PCBs.

The SMOC Working Group established the Substance Selection Process to facilitate a systematic, rigorous and transparent consideration of substances that may be addressed by additional NARAPs. The process has three stages:

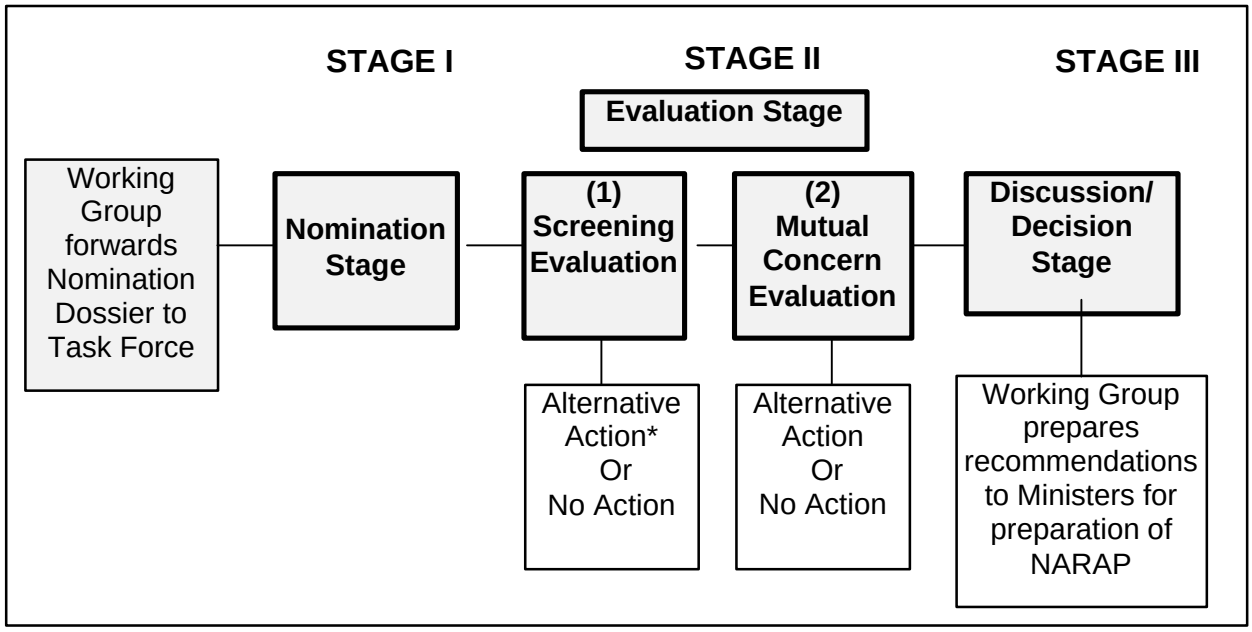
(i) A *Nomination Stage* (Stage I) that involves review of a Nomination Dossier prepared by one or more of the three Parties and which is referred to the SSTF by the SMOC Working Group. The Nomination Dossier contains standardized information for each nominated substance. The purpose of the review is to assess whether there is justification for the nominated substance to proceed to the next stage of the Substance Selection Process.

(ii) An *Evaluation Stage* (Stage II) that consists of two parts. First, a *Screening Evaluation*, to assess whether a substance deserves further attention on the basis of scientific considerations, including evidence of entrance to the environment, transboundary environmental movement, persistence, bioavailability and bioaccumulation, and that credible risk assessment documents exist. Second, a *Mutual Concern Evaluation*, to determine the degree to which all Parties agree there is a problem and that there would be real benefits from collective action.

(iii) A *Decision Stage* (Stage III) is when a Draft Decision Document is prepared, recommending a course of action to the Working Group for the nominated substance. The recommendation could be: 1) for the development of a NARAP, 2) for alternative action, or 3) for no action. The NARAP will also identify issues related to key implementation considerations.

The SMOC Working Group referred four Nomination Dossiers to the SSTF on 21 May 1998: those on dioxins and furans, hexachlorobenzene (HCB), lindane, and lead. This Decision Document on hexachlorobenzene is the second to be produced out of the Substance Selection Process, the first being the Decision Document on dioxins and furans.

Figure 1: Flow Diagram of the Substance Selection Process



* "Alternative Action" might entail, but is not limited to, recommendations for acquisition of more information, or taking action in another forum.

Substance Selection Task Force Members

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Karen Lloyd	Chemicals Evaluation Division Commercial Chemicals Evaluation Branch Environment Canada
Waldemar Braul	ENGO Observer West Coast Environmental Law Association

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United States

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Secretariat

A.L. Hamilton	Commission for Environmental Cooperation
Tom Conway	Resource Futures International, Ottawa
Danielle Cantin – until 2/99	Commission for Environmental Cooperation
Mara Kerry – as of –4/99	Commission for Environmental Cooperation

1.0 Principle Recommendation to the SMOC Working Group

We recommend the development of a North American Regional Action Plan for hexachlorobenzene based on the results of our review under the *Process for Identifying Candidate Substances for Regional Action under the Sound Management of Chemicals Initiative* (Substance Selection Process).

2.0 Review of the Results of the Substance Selection Process

2.1 Nomination

The SSTF reviewed the nomination dossier and concluded that there was ample justification for continuing with hexachlorobenzene in the Substance Selection Process. Reference may be made to Appendix I of the Nomination Dossier for additional information on hexachlorobenzene.

2.2 Summary Screening Evaluation - Stage II(1)

SSTF members considered the evidence for hexachlorobenzene in meeting the criteria for Stage II(1) based on the following arguments:

Criterion (i) *'may enter,' 'is entering' or 'has entered' the North American ecosystem (emissions, media, biota).* There was consensus that this criterion had been met, although only limited data was available for Mexico.

Criterion (ii) *'available and acceptable risk assessment(s).'* There are Canadian, US and international risk assessments for HCB meeting this criterion.

Criterion (iii) *'judgement on measured/predictive data on the following: bioaccumulation, persistence, bioavailable.'* There was consensus that adequate evidence exists for HCB being bioaccumulative and persistent. Its persistence is well established in good quality studies on many species.

Criterion (iv) *monitoring evidence of transboundary environmental transport for POPs (e.g., appearance in biota), OR indirect evidence of transport potential (e.g., air persistence >2 days; and volatility >1000Pa for POPs).* Current evidence is sufficient to demonstrate long-range transport has occurred and, therefore, this criterion has been met.

2.3 Summary of the Mutual Concern Evaluation – Stage II(2)

2.3.1 Nature and Extent of Risk to Human Health or the Environment in North America

HCB has been shown to be persistent in the environment. The toxicity of HCB to biota (and in experimental animals) has been demonstrated at very low concentrations and includes multi-site cancers and a wide range of other effects on, for example, the nervous system and reproductive system. High levels of HCB have been observed in the Great Lakes Basin ecosystem in top predators such as peregrine falcons and piscivorous marine and freshwater mammals. Such data indicate that HCB biomagnifies up the food chain.

Current levels of HCB in air, water and forage fish from the Great Lakes and connecting channels have the potential to cause harmful effects to fish-eating mammals, such as mink. The available data on current levels further indicate that HCB has the potential to cause reproductive impairment to predatory bird species across Canada, including the endangered peregrine falcon.

2.3.2 Nature and Extent of the Evidence of Transboundary Environmental Transport in North America

Long-range transport plays a significant role as a continuing means of redistribution of HCB throughout the environment, with a tendency for migration toward higher latitudes. HCB has been detected in Arctic air, snow, seawater, vegetation and biota. Long-range transport and deposition is estimated to contribute 510 kg/year of HCB to the Canadian environment. Re-release to the environment takes place via incineration of HCB-containing wastes and through the use of certain pesticides and chlorinated solvents. Levels HCB in human tissues and breast milk in some populations in northern latitudes (Canada) are elevated compared to more southerly areas.

HCB is persistent in environmental media. Indications are that the half-life of HCB in water and the atmosphere ranges from 2.7 to 6 years and may be greater than six years in soils and sediments.

2.3.3 Degree to which Human Health or Environmental Benefits in North America can be Demonstrated to be a Result of Collective Action

Lower environmental levels of HCB could decrease the risk to breast-fed infants in certain populations heavily dependent on fish, and reduce risks of spontaneous abortion and developmental effects. There is evidence that past decreases in HCB releases have resulted in reduced human exposure. Further reductions are necessary to recover compromised populations of raptor species and carnivorous mammals whose current levels of exposure are at, or close to, levels associated with population effects.

Additional significant benefits of collective action on HCB are anticipated as a result of:

- technology transfer (disposal practices and production processes);
- identifying specific groups at risk (farmers, employees in chlorinated solvent plants and consumers of meat products from open grazing animals);
- pooling of resources to reduce emissions and exposures; and
- capacity-building, particularly in Mexico where there is a need for improvements in monitoring and other information gathering.

3.0 Analysis of Major Implementation Considerations for Hexachlorobenzene

The purpose of this section is to explore a range of considerations that influence the priority and timing for developing and implementing a Regional Action Plan for hexachlorobenzene in North America.

3.1 Public Health and Environmental Measures Available to Reduce Risk

Among other elements, this effort will require improved technology development and demonstration as well as additional and improved monitoring and surveillance of hexachlorobenzene concentrations in sources, ambient media, and exposure pathways. Exchanges of data, information, monitoring and analytical technologies, will be required to reduce remaining scientific uncertainties about the risks to the environment and human health posed by hexachlorobenzene.

Experience in Canada and the United States has shown that improvements in technology can lead to dramatic reductions in releases of hexachlorobenzene from various industrial sectors. For example, chlor-alkali and sodium chlorate producers in Canada switched from graphite cells to dimensionally stable anodes in their electrolytic cells, thus eliminating production of chlorinated benzene. Similar successes have been achieved through improvements in technology for incinerators and other HCB-producing combustion sources. Unilateral regulations, bilateral agreements, and various voluntary initiatives have all contributed to the development of measures to reduce releases of hexachlorobenzene.

3.2 Benefits to Human Health and the Environment

There is ongoing discussion among the Parties about the human health and environmental benefits that would be realized in North America from collective actions to control releases of hexachlorobenzene. At the outset, Mexico may be the principal beneficiary of shared scientific knowledge and, as a result, may avoid the problems encountered in recent decades by the United States and Canada.

Airborne transport and deposition is a major source of hexachlorobenzene in the Arctic region. Exposure to organochlorines, such as HCB, is much greater in this region than in southern regions of Canada.Infants are inclined to be more susceptible to the effects of organochlorines than adults, especially those who have been breast-fed, since HCB accumulates in human milk. In northern Quebec, levels of HCB in Inuit mothers' milk are five to nine times higher than those in southern Canadian non-Aboriginal mothers' milk (Indian and Northern Affairs Canada 1997).

A benefit to all three Parties of reducing exposure to hexachlorobenzene would be a reduction of risks posed to sensitive sub-populations such as those in the far north. In addition, all three Parties have subpopulations at higher risk due to nutritional deficiencies, multiple exposures, and sensitivities, for whom any reduction in hexachlorobenzene exposure would be beneficial. Ecological risk assessments in North America have found that hexachlorobenzene, because it is bioaccumulative and persistent, poses the greatest risks to piscivorous mammals and birds because of their position at the top of the foodchain.Reductions in releases to the environment should benefit these biota.

3.3 Sustainability of Food Production

Food production in Canada, the United States and Mexico is unlikely to be affected by initiatives undertaken to reduce exposure to hexachlorobenzene. Hexachlorobenzene is no longer used as a pesticide in the three countries, and thus reduction or elimination of hexachlorobenzene will not lead to substantially changed agricultural practices.

3.4 Feasibility and Availability of Alternatives

In relation to waste combustion sources, in Canada and the United States emission controls are or soon will be in place with up-to-date technologies that can be used by Mexican industries, allowing them to grow while reducing or avoiding the emission of hexachlorobenzene. Some industries may emit hexachlorobenzene as a byproduct, and here the issues of technology exchange and best practices will have to be addressed. It is expected that most hexachlorobenzene reduction will be achieved via technological process changes, since this is no longer a commercial product.

3.5 Societal Capacity for Change

Hexachlorobenzene sources in the United States and Canada are generally large point sources, but sources in Mexico are not well understood. The recent and planned reductions in releases of hexachlorobenzene in Canada and the United States demonstrate that the societies in these countries have the capacity to change their behaviors in order to reduce the risks posed by this substance. Without further information on

hexachlorobenzene sources in Mexico, it is hard to gage the societal capacity for change in that country.

3.6 Implications/Opportunities for Economy and Trade

Experience to date with point sources in Canada and the United States (e.g., incinerators, pesticide byproducts) indicates that serious effects on the economies of either country are unlikely, although significant costs may be incurred by the industries involved. The implications of hexachlorobenzene controls on the Mexican economy are unknown. Significant impacts on international trade as a result of controls on hexachlorobenzene releases are not expected.

3.7 National Capacity to Take Action, Available Expertise and Technology

Capacity-building measures are required to develop expertise and technology in Mexico and enable appropriate monitoring and surveillance activities across North America. There is a need to provide systematic monitoring of hexachlorobenzene levels in all three countries.

Sources and releases of hexachlorobenzene in Mexico are not well understood, and significant data gaps and uncertainties remain with respect to the Canadian and US inventories (see Appendix 4). Completion of a North American inventory would give a better idea of what capacity is required to take action and provide the basis for development of rational control strategies.

There is a need to develop and improve tools and information that quantitatively link emissions to general population exposure. These will include source testing and methods development, long-range transport modeling, chemodynamic fate studies, screening and testing improvements (e.g., immunoassays and gene probes), ambient measurements, and the identification and modeling of human and non-human exposure pathways. Such technological improvements could be shared among the Parties. This could be an integral part of programs already in place that address persistent, bioaccumulative, and toxic substances.

3.8 Jurisdictional and Regulatory Opportunities for Change

Alternatives toHCB-containing products such as pesticides usually consist of replacement with safer products. When such substances as HCB are generated as undesirable process by-products, solutions may consist of improved or alternative processes to reduce or eliminate their generation. Some alternatives have been successfully implemented for combustion sources and chlor-alkali and sodium chlorate production. Other sources are site-specific (e.g., contaminated sites and landfills). The challenge is to identify and

assess the various alternative processes in order to select the most appropriate for each situation and industry. In Canada, hexachlorobenzene has been identified as a Track 1 substance under the Toxic Substances Management Policy and is thus slated for virtual elimination.

Although regulatory programs at the national and state or provincial levels are well established in the United States and Canada for remediation activities (e.g., Superfund in the United States), it is unclear whether they are sufficiently comprehensive. The Parties should review these programs and the basis for their establishment in order to determine if similar approaches are applicable in Mexico.

3.9 International Commitments and Obligations

In 1998, Canada signed the UN-ECE Protocol on Persistent Organic Pollutants that calls for Parties to apply 'best available technology' (BAT) to emissions of a number of substances, including hexachlorobenzene. Hexachlorobenzene has also been proposed for inclusion in the base agreement currently being negotiated at the United Nations by the International Negotiating Committee (INC) which is intended to result in global control of persistent organic pollutants.

The United States is committed to identifying and characterizing additional sources of dioxins and dioxin-like compounds (i.e., furans, PCBs and HCB), and to identifying and characterizing the pathways and mechanisms that lead to human exposures. This includes establishing an ambient air network for dioxin-like compounds in the United States, characterizing and tracking levels of dioxins and dioxin-like compounds in the US food supply, and developing the scientific capability to quantitatively link sources to dietary levels.

The United States intends to share the knowledge and experience gained in these efforts with the other Parties and, similarly, to benefit from the experience and information gained by the other Parties. The United States intends to work cooperatively with Mexico and Canada in expanding a shared understanding of the fate, transport and transformation of dioxins, furans and related compounds in North America.

4.0 Recommendations to the Working Group on the Scope of the North American Regional Action Plan for Hexachlorobenzene

Three overarching points are relevant when reviewing these recommendations. First, hexachlorobenzene is capable of long-range transport and current unilateral and bilateral initiatives do not provide for adequate control of transboundarypollutant migration. Second, Mexico does not currently possess the capacity to identify and reduce releases of hexachlorobenzene.Consequently, Mexico would greatly benefit from the capacity-

building and technology transfer efforts that would be part of a North American Regional Action Plan for hexachlorobenzene. Third, NARAPs on dioxins and furans and hexachlorobenzene could be coordinated closely since a strong relationship exists between HCB formation and dioxin formation as combustion by-products.

The following elements could be included in a NARAP on hexachlorobenzene:

1. Actions to improve national capacities to adopt measures to reduce risks to human health and the environment.

2. Short, medium and long-term risk reduction actions consistent with regional needs and objectives.

3. A strategy to address the financial commitments required by actions proposed in the NARAP.

4. Actions designed to improve the assessment of risk in the three countries by:
   - updating and completing the sources and releases inventories for Canada and the United States (see Appendix A for overview of the current state of knowledge);
   - initiating the development of a sources and releases inventory for Mexico;
   - developing a strategy to estimate human and environmental exposures and risks in Mexico; and
   - sharing expertise and knowledge on analytical capacities among the three countries.

5. Actions designed to analyze and implement risk reduction measures by:
   - identifying technological changes (best practices) that have been made in various industrial sectors to reduce releases of hexachlorobenzene, including reviewing the costs and benefits of the technological changes to facilitate priority setting;
   - completing the review of national and international control strategies for hexachlorobenzene (see Appendix A for an overview) so that poorly controlled sources and releases, particularly those that could lead to transboundary transport, can be identified;
   - ensuring that information on analysis and implementation of risk reduction measures is shared among the three Parties; and
   - based on this review and analysis, developing and implementing measures to reduce risks to human health and the environment, including exploring the effectiveness of voluntary approaches relative to other policy instruments.

6. Actions designed to determine the success of the NARAP, including performance indicators measuring:
   - tissue levels in piscivorous mammals and birds;
   - shellfish and fish advisories (related to hexachlorobenzene); and
   - transboundary fluxes.