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STOCKHOLM CONVENTION

GENERAL GUIDANCE ON POPs INVENTORY
DEVELOPMENT

JUNE 2020





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ABBREVIATIONS AND ACRONYMS

BAT/BEP	Best available technologies and best environmental practices
BDEs	Brominated diphenyl ethers
CAS	Chemical Abstract Service
CBI	Confidential business information
COP	Conference of the Parties
FAO	Food and Agriculture Organization of the United Nations
HBCD	Hexabromocyclododecane
HCBD	Hexachlorobutadiene
HS code	Harmonized system code at Customs
NGOs	Non-governmental organizations
NIPs	National implementation plans
PBDEs	Polybromodiphenyl ethers
PCNs	Polychlorinated naphthalenes
PCP	Pentachlorophenol
PFOS	Perfluorooctane sulfonic acid
POPs	Persistent Organic Pollutants
UNEP	United Nations Environment Programme

1. INTRODUCTION TO THE GUIDANCE DOCUMENT

1.1 PURPOSE OF THE POPs INVENTORIES

A POPs inventory is a compilation of information on past and present production and uses of a chemical listed in the Stockholm Convention on Persistent Organic Pollutants (POPs) in the country. As many POPs are used in the manufacture of products/articles which may have a long service-life, a comprehensive inventory should also estimate the amount of POP in the products/articles in the country (e.g. in buildings or used by consumers) along the whole life-cycle, thus contributing to the provisions of Article 6 of the Convention on management of waste. An inventory could also address sites which may have been contaminated by production, use, or accidental releases of POPs.

Preparing an inventory that gives a full picture of a POP use in a country requires use of various sources and data collection methods. The inventory is based on information in literature (studies, scientific articles, government reports), complemented by information from interviews with producers, importers and users of the POP or the products/articles that have been manufactured using the chemical. In the best case this information can still be verified with and complemented by chemical analyses.

POPs inventories are not explicitly mentioned in the Convention requirements. The Parties are, however, required to develop a plan for meeting their obligations under the Convention in accordance with Article 7. The inventory and the picture of the chemical in the country it provides will help the country to prioritise and develop actions that are relevant, focused, proportional, and cost-effective.

The inventory report can be also used for other purposes such as feeding into Article 15 national reporting, development of other projects, and developing effective strategies and action plans for managing POPs to meet the obligations under the Convention.

Furthermore, regarding specifically pesticides, the following benefits have been noted from having a reliable inventory (FAO, 2010):

- (a) Prioritizing pesticides sites according to the level of risk that they pose to public health and the environment;
- (b) Planning safeguarding activities;
- (c) Identifying the manufacturers, suppliers and donors of obsolete pesticides who may be willing to provide resources for their disposal and remediation;
- (d) Planning campaigns for the private sector to surrender obsolete stocks;
- (e) Planning the subsequent disposal of obsolete stocks;
- (f) Planning the remediation of contaminated sites;
- (g) Developing a programme to avoid the reoccurrence of obsolete pesticides.

1.2 PURPOSE OF THIS GUIDANCE DOCUMENT

In accordance with Article 7 of the Stockholm Convention, following the decisions of the Conference of the Parties (COP) to list new POPs in the Convention, each Party shall review and update their national implementation plans (NIPs). The updated NIPs should be transmitted to the COP within two years of the date in which these amendments entered into force.¹

In its Decision SC-1/12, the COP adopted guidance for the review and updating of NIPs. The guidance has been periodically updated to assist Parties to take into account the new POPs listed in the Convention since their previous NIP and the COP has encouraged Parties to use the revised version, as appropriate.

A number of guidance documents to support Parties to review and updating NIPs have been developed, e.g. Guidance for Developing a National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (UNEP, 2017a). All guidance documents are available on the website of the Stockholm Convention.² As part of the technical assistance plan of the Basel, Rotterdam and Stockholm conventions, the Secretariat, UNEP and other implementation agencies provide technical assistance to Parties to support review and updating of NIPs. Please contact the Secretariat³ for assistance.

The purpose of this guidance document is to provide a general introduction to the inventory approach used in the detailed inventory guidance, which the Secretariat has developed to assist countries in making inventories for certain POPs. This guidance is also intended to assist Parties in developing inventories for POPs for which a detailed guidance document is not available. The detailed inventory guidance documents should be used in conjunction with this document. In addition, when developing an inventory, the detailed guidance documents may be used as an example on approaches and information sought.

The following is a list of detailed specific guidance documents for preparing inventories:⁴

- (a) Guidance on preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants (UNEP, 2017b);
- (b) Summary guidance on preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants (UNEP, 2019a);
- (c) Guidance on preparing inventories of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants (UNEP, 2017c);
- (d) Guidance on preparing inventories of hexabromocyclododecane (HBCD) (UNEP, 2017d);
- (e) Summary guidance on preparing inventories of hexabromocyclododecane (HBCD) (UNEP, 2019b);
- (f) Guidance on preparing inventories of hexachlorobutadiene (HCBD) (UNEP, 2019c);
- (g) Guidance on preparing inventories of polychlorinated naphthalenes (PCNs) (UNEP, 2019d); and
- (h) Guidance on preparing inventories of pentachlorophenol (PCP) and its salts and esters (UNEP, 2019e).

¹ Amendments shall not enter into force for those Parties that have submitted a notification pursuant to the provisions of paragraph 3(b) of Article 22 of the Stockholm Convention. Also, in accordance with paragraph 4 of Article 22, the amendment will not enter into force with respect to any Party that has made a declaration regarding the amendment to the Annexes in accordance with paragraph 4 of Article 25. Such Parties shall deposit their instruments of ratification regarding the amendment, in which case the amendment shall enter into force for the Party on the ninetieth (90) day after the date of deposit with the Depository.

² <http://chm.pops.int/tabid/7730/Default.aspx>.

³ Secretariat of the Basel, Rotterdam and Stockholm conventions, Email: brs@brsmeas.org.

⁴ <http://chm.pops.int/tabid/7730/Default.aspx>.

1.3 OBJECTIVES OF DEVELOPING AN INVENTORY

The main objective of developing an inventory is to acquire information for the review of the NIP and the various information requirements of the Convention (e.g. Article 15 reporting).

More specifically, the objectives are to:

- (a) Provide the basis for identification of the national priorities in the NIP (i.e. the quantities of the POP that are produced, used, stored as stockpiles, and generated as waste in the country, identify the important economic sectors and operators and the type of actions required for those sectors, estimate the capacities needed for implementation, identify sources that should be prioritised);
- (b) Identify dispersive uses in open applications that might pose a risk to humans and the environment for prioritisation;
- (c) Provide a basis for the evaluation whether the current national use, production, chemical and waste management meet the requirements of the Convention and identify areas where they do not;
- (d) Provide information on the need for specific exemptions or acceptable purposes, if available;
- (e) Support Article 15 reporting to the Convention;
- (f) Identify the relevant stakeholders in the government, academia, industry, waste management, commerce, NGOs, etc.;
- (g) Identify areas where financial or technical support are needed to fill in the information gaps in the inventory/fulfil the obligations of the Convention.

The information to be obtained for the inventory may include:

- (a) Amounts of production, import, export at the national level;
- (b) Uses of the chemical in the country;
- (c) Presence of products/articles consisting of, containing or contaminated with the POP on the market and in service;
- (d) Imports of products/articles consisting of, containing or contaminated with the POP into the country;
- (e) Waste streams of importance consisting of, containing or contaminated with the POP;
- (f) Disposal practices for the POP, products/articles consisting of, containing or contaminated with the POP and its related substances when they become wastes;
- (g) Stockpiles of the POP;
- (h) Releases of the POP into the environment from point sources;
- (i) Sites potentially contaminated with the POP;
- (j) Potential harmful exposure of humans and environment.

Both the amount of chemical itself as well as the amount of materials containing the chemical should be addressed. Amount produced, imported, exported and used in the country are important to monitor success in phasing it out. The volumes of materials containing the POP are important for the waste management according to Article 6 of the Convention. The Basel Convention has adopted a series of technical guidelines for the management of waste containing POPs, which should be consulted (see General technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (UNEP, 2017e)).

1.4 PROPOSED INVENTORY PROCESS

The inventory approach proposed in the guidance is tiered to allow Parties to tailor their inventories according to their needs and capacities, adjusting the scope in the course of work based on the findings. The inventory process is iterative. The inventory can be improved over time when resources and technical capacity become available.

A multi-stakeholder inventory team consisting of authorities, experts, relevant industries and NGOs should be established to coordinate the work and develop the initial scope and workplan for the inventory. The outcome of the work should be a final report that includes the process, sources, assumptions, estimations, and calculations in a transparent way to facilitate future improvements when new information becomes available.

The first phase (**Tier I**) in the inventory is to make an initial assessment on the production and use of the POP in the country based on available information. The outcome could be a literature study complemented with information in the inventory team stakeholders. A full picture of the particular POP may not be achieved based only on available information, but the workplan and scope of the inventory may be further refined by e.g. being able to exclude some applications in the country.

In the second phase (**Tier II**), further information (and likely the main body of the information) is collected through interviews and questionnaires to stakeholders, i.e. producers, users, users of the products/articles consisting of, containing or contaminated with the POP, waste managers etc. Based on information from the producers and users of the POP, the team should have a reasonable understanding on the flows and uses of the chemical in the country as well as the magnitude and concerned sectors of stockpiles and materials containing the chemical.

In the third phase (**Tier III**), in-depth information can be acquired for sectors of special interest and uses of importance to fill-in gaps in the information through chemical analyses and site visits. Analyses are usually expensive and require a lot of technical expertise. Moreover, analytical methods may not be readily available for some POPs.

The structure and organisation of the inventory is always dependent on the chemical, local circumstances, and priorities of the country and the inventory team. Therefore, the guidance is not intended to be prescriptive, but to give ideas for tailoring the approach.

1.5 TREATMENT OF CONFIDENTIAL INFORMATION

The use of chemicals in the production is often considered confidential business information (CBI) and is not available in open literature. Concerns over treatment of commercially valuable information may hamper the success of the inventory team in receiving information from the private sector. Stakeholders may wish to keep information that is required to estimate chemical use in the country, such as annual sales or production data, confidential from their competitors. In such cases, it is important to be able to provide guarantees to the companies that the information they provide will not be passed on to third parties. In addition, it should not be possible to deduce quantities for individual stakeholders from the data provided in the reports. This is especially challenging in situations where there are only few companies operating in the sector.

Data in the inventory report do not need to be reported as stakeholder-specific information. It can be aggregated or processed to accommodate trade-related concerns from the industry. It is important to consider the level of detail the inventory needs and alternatively consider asking the stakeholders to report their yearly production, consumption or sales of the chemical and its related substances themselves in an aggregated form that they are comfortable with.

The industry also has inherent interest in providing the authorities with factual information on the use and production of a POP, as this would enable the Party to register for acceptable purposes and specific exemptions as necessary, and also reflect their needs in their national regulations.

For an approach to the treatment of confidential information under the Stockholm Convention, please consult the *Code of practice for the treatment of confidential information in the POPs Review Committee* (UNEP, 2007).

2. MAKING AN INVENTORY

This chapter presents the process for developing an inventory that is principally applied in the detailed inventory guidance documents. As the inventory approaches for POPs pesticides are partially different from industrial POPs, the guidance differentiates these approaches, where necessary.

2.1 COLLECTING BACKGROUND INFORMATION ON THE PRODUCTION AND USE

In the beginning of the process, the background information available for the POP should be compiled to get a general understanding on its production and use. These data are often not country-specific, but give guidance on which sectors the chemical is potentially used in. Most POPs are or have been produced in relatively few countries, which may help identifying the sources and stakeholders.

All “new POPs”, i.e. those that have been listed in 2009 and thereafter, have gone through the process for listing of chemicals in Annexes A, B and/or C in accordance with Article 8, during which the POPs Review Committee has collected the information available at the time. The POPs Review Committee’s *Risk Profiles* and *Risk Management Evaluations*, available on the Stockholm Convention website,⁵ provide a scrutinized overview of the chemical properties, production, uses, releases and risks related to the POP. These documents may help identifying the need for an inventory and the relevant industries and stakeholders, focusing the further collection of information at the national level, and refining the scope of the inventory.

Following the listing, the relevant bodies of the Basel Convention prepares technical guidelines for the environmentally sound management of POPs waste, available on the Basel Convention website.⁶ These guidelines provide updated information on production and use, overview of the waste streams relevant for the substance, as well as define the destruction technologies that can be considered environmentally sound in line with the provisions of Article 6 of the Stockholm Convention.

Further background information can be found in the specific inventory guidance documents, which have been prepared for a few POPs, as well as open literature, and possible BAT/BEP guidance documents prepared by the Secretariat. In addition, the possible national registers on chemical products and pesticide registers may contain relevant information in an easily accessible form.

2.2 STEP 1: INITIATING THE INVENTORY DEVELOPMENT PROCESS

The first priority is to define the scope of the inventory and identify the relevant sectors in the country based on the background information collected. The scope can be further refined when new information (such as different uses and their scale) becomes available.

It is also important to clearly assign the responsibility for developing the inventory. The national focal point of the Stockholm Convention could initiate the inventory process in cooperation with the potential Steering Committee established for updating the NIP.

2.2.1 Establishing a national inventory team

Consider establishing a national inventory team to oversee the inventory work, define the scope, and develop the final report. The inventory team may consist of government agencies, academia, advisory bodies, industries, waste management, commerce, NGOs etc. that have knowledge on the production and use of the POP or products/articles consisting of, containing or contaminated with the POP. The composition of the inventory team depends largely on whether the POP is a pesticide or an industrial chemical, or both. Special attention should be paid to ensure participation of industries that operate in areas for which acceptable purposes or specific exemptions have been identified.

⁵ <http://chm.pops.int/tabid/243/Default.aspx>.

⁶ <http://www.basel.int/tabid/5875/Default.aspx>.

For inventories on POPs pesticides, the inventory team could include representatives of pesticide registration authorities, municipal authorities, agricultural advisory bodies, pesticide industry and trade association, customs service, relevant universities or research institutes, organized labour and trade unions, farmers and consumer associations, among other NGOs.

For inventories on industrial POPs, the inventory team could include the authorities in the field of chemicals management, chemicals registries,⁷ the customs service, representatives from larger stakeholders involved in the production of the POP (if taking place), representatives from the industrial sectors using the POP in manufacture, organized labour and trade unions, universities and research institutes, the relevant NGOs.

The national focal point for the Stockholm Convention could serve as leader of the team and convene the meetings. National and/or international consultants with relevant expertise could be hired to do the work and report to the team. The team could also sub-divide into smaller sector-specific groups, once the information becomes available, to focus on smaller parts of the inventory.

The national focal point should brief and educate the team on the Stockholm Convention's mandates, obligations and the new POPs.

The knowledge in the inventory team can help identifying the production and supply of the POP and the relevant areas of industrial and professional use, making the inventory as practical and effective as possible. The industries involved in the production, import, and use of the POP should be involved in the discussion on the scope of the inventory (see Chapter 2.2.3), as they may be able to estimate historical and current amounts in different applications.

2.2.2 Identifying relevant stakeholders

Based on the tentative information on production and use of the POP in the country, the team should identify relevant stakeholders, who will be contacted for the information in the process. The detailed inventory guidance documents contain lists of suggested stakeholders, which are dependent on the chemical in question and its uses.

Generally, however, it could be considered that for developing inventories of **POPs pesticides**, the following stakeholders likely have relevant information: pesticide industry and/or importers, environmental authorities, pesticide registration authorities (as appropriate), pesticide trade associations and individual traders, agricultural advisory organisations, agricultural research and educational institutions, farmers associations, municipalities, and environmental NGOs. Waste issues are very relevant, especially for banned pesticides.

For **wood preservatives**, the list would include wood preservation industry, user organisation (such as utility pole users i.e. energy and telephone companies), manufacturers, importers and traders, registration authorities (as appropriate), research and educational institutions, and environmental NGOs.

For **industrial POPs**, the stakeholders could include the producers and/or importers, environmental authorities, chemicals registration authorities (as appropriate), chemicals trade and associations and relevant industry associations, manufacturers and users' organizations and larger enterprises using the POP, relevant research and educational institutions, and consumer and environmental NGOs. All areas with continued use should be included.

Especially with industrial POPs used in the production of materials, equipment, products/articles, or those sold for household use, the information on uses and amounts may only be available from the relevant industry and trade. Therefore, special effort should be put to list all relevant stakeholders in the country who might have information on the POP. Identifying stakeholders that produce, import and use the chemical can be used in the future for direct outreach when regulations change etc.

A list of potential stakeholders in Table 3-1 and appendix 2 of the detailed inventory guidance for PFOS (UNEP, 2017b) can be used as guidance when identifying the relevant key stakeholders and the defining of the inventory's scope.

⁷ In some countries the industry or importers are required to report their use of chemical compounds, including the amount used and type of use, to the authorities. This information may be registered in a database together with the identity of the substance, providing a national register of products.

2.2.3 Defining the scope of the inventory

Defining the scope of the inventory means identifying the relevant national sectors to be investigated in the process, planning the use of resources, and the extent of the activities needed. The inventory process is tiered and the scope will likely need to be adjusted as information on the situation in the country becomes available.

The following considerations are important for defining the scope of the inventory:

- (a) Obligations of the Stockholm Convention, including the possible acceptable purposes and specific exemptions;
- (b) Objectives of an inventory (see Chapters 1.1 and 1.3);
- (c) Available resources and capacity (financial and human resources, analytical capacity);
- (d) Life-cycle of the POP;
- (e) National priorities (e.g. developing NIPs).

During the planning stage, it may be more efficient to contact and consult only a small number of stakeholders, such as main manufacturers, national industrial/agricultural associations and the customs service.

Depending on the availability of resources and information (at this point possibly there are only international sources and information from the inventory team), decide whether to develop an overall inventory of production, use, stockpiles, products/articles in use and waste, or whether there are some sectors that can be excluded from the inventory.

The inventory should always address the whole life-cycle of the POP, addressing potential production or import, different industrial uses, stockpiles, use in the production of products/articles as well as their service life, including waste management.

It should also be considered to what extent potential contaminated sites should be included in the workplan.

For POPs pesticides, the key question is whether the pesticide is still in use in the country, or should the work focus completely on waste inventory.

The members of the inventory team may have important country specific information, which could help focusing the inventory, identifying the applications to cover and stakeholders that should be approached for further enquiries.

It is also recommended to consider early in the process whether there are any synergistic approaches that could be taken to increase the cost effectiveness and efficiency in developing inventories. For instance, it is more efficient to develop a full obsolete pesticide waste inventory (or at least all POPs pesticides) in one go instead of just an inventory focused on one chemical. Similarly, it is more efficient to combine inventories on certain sectors, for example as both HBCD and POP-BDEs have been used in electric and electronic appliances, their inventories could be carried out simultaneously in common sectors of use.

When planning the degree and depth of the inventory it may be useful to consult the Chapter 2.3 on data collection and Chapter 2.4 on collecting and compiling data, and consider the resources needed for an inventory in relevant national sectors using a tiered approach. Minor uses could be excluded from the inventory and prioritize the use of time and resources in collecting information in more significant categories only.

2.2.4 Developing a workplan

The national inventory team should develop a workplan for the inventory including:

- (a) Inventory strategy;
- (b) Data collection methodologies to be used;
- (c) Activities needed;
- (d) Resource allocation including responsibility and budget;
- (e) Timeline and milestones.

The data collection methodologies are in tiered approach, as described in Chapter 2.3. The degree and depth of the inventory depend on the objectives chosen and have to be determined based on the availability of resources and capacity. A detailed inventory may not be possible for all sectors without conducting chemical analyses. Collecting basic inventory-related information, however, is the minimum requirement for the inventory to identify the main sources of the POP.

2.2.5 Contacting the stakeholders

Stakeholders will likely need to be contacted several times in the course of the inventory. It may be useful to contact them at the beginning of the inventory to inform them about its background and scope. This can give them a better understanding of the aim of the inventory and an opportunity to communicate their views and questions, and to identify more relevant stakeholders. Early stakeholder feedback can also help focus the inventory, thus making it as practical, effective and accurate as possible.

In the initial contact, it may also be helpful to explain the purpose of the Stockholm Convention, present the NIP and explain the globally agreed and national restrictions for the chemical. Examples of information that could be shared in the initial contact can be found in the annexes of detailed inventory guidance documents.

Depending on the circumstances, it may also be useful to organise stakeholder group meetings, where many stakeholders in the same sector are invited. For example, in an inventory on fire-fighting foams the many professional users from different areas (airports, fire-brigades, oil-refineries, chemicals industry etc.) across the country could be invited. The inventory of waste streams may also involve a range of stakeholders at different levels.

On pesticide inventories, the stakeholders could be contacted in the context of other agricultural events.

It is also important at this point to communicate the arrangements for treatment of confidential business information (Chapter 1.5), as it will improve the cooperation and facilitate disclosing the information without commercial losses.

2.3 STEP 2: CHOOSING DATA COLLECTION METHODOLOGIES

There are a number of different approaches that have been used for gathering information for POPs inventories. The methodologies can be divided into three groups:

- (a) **Indicative method:** desk study of existing information, workshops and interviews provide initial information for further planning of the inventory depending on the amount of resources (i.e. human and financial situation). This method is quick and does not require significant human and financial resources. This method is normally used in the initial assessment (Tier I).
- (b) **Qualitative method:** use interviews, questionnaires (see detailed guidance documents for examples) and literature surveys to obtain more specific data. Estimations are based on information on quantities of POP used and production volumes in manufacture of products/articles. Workshops may also be helpful in obtaining data from the industry. This method is normally used in Tier I and II.
- (c) **Quantitative method:** collecting specific in-depth information from interviews, site visits and chemical analyses. This is an advanced stage of the inventory that includes detailed interviews with industry and associations where also questionnaires (see detailed guidance documents) can support the survey and possibly site inspection. The quantitative methods include use of chemical analyses to fill-in gaps in the information needed for inventory. This could, for example, include analysing POP content of products/articles imported or on the market. Chemical analyses are expensive, require specific expertise and are normally not used for the in-depth inventory for specific sectors only. This method is normally used in Tier III.

Examples of different data collection methodologies:

Desk study of existing information

Gathering information about existing past and current national data on the production and use of the POP, and on products/articles consisting of, containing or contaminated with the POP. This information can be obtained from the industry and commerce, permit authorities, customs services, national bureau of statistics and national central bank, published literature in scientific journals, technical reports or notes, research reports, phone books and Internet searches. Information on pesticide waste could be collected by regional and municipal agricultural and environmental authorities. The information should be compiled, evaluated and verified to the extent possible, and a gap analysis of the data could be undertaken as well. Desk studies are usually carried out in the initial assessment phase (Tier I).

National awareness raising/inventory workshop on the Stockholm Convention and new POPs

A national workshop can involve stakeholders from all sectors that are/were using the POP or products/articles consisting of, containing or contaminated with the POP. The importance of their cooperation in the inventory work to meet the Country's commitments to eliminate POPs could be emphasized. Treatment of confidential business information should be agreed upon to ensure that the information required can be received, and appropriately shared e.g., in aggregated form (without possibility to trace information of an individual company) or in ranges. Breakout sessions and group meetings can be organized during the workshop to ensure that all sectors in which the POP has been used are adequately covered as well as to get consensus on how best to collect and compile data.

Questionnaires

Questionnaires are valuable instruments for primary data collection in inventory programs. Based on contact and consultation meetings with stakeholders, questionnaires with explanatory notes can be developed and sent to the relevant stakeholders to gather the information needed to compile data for a Tier II or Tier III assessment. Treatment of confidential business information is vital.

Questionnaires can be administered through various outreach mechanisms, including electronic distribution, post; supply chain distribution; distribution via trade unions, NGOs, local governments and community leaders. Questionnaires might also be used for one-on-one interviews or in the frame of a stakeholder workshop. For examples on questionnaires, see the chemical-specific detailed inventory guidance documents.

Site inspection, sampling and analysis

Samples of products/articles can be collected during on-site visits of relevant facilities, shops, recycling facilities, and waste disposal/storage facilities. The screening and analysis of POPs and HBCD containing products/articles is described in the *Guidance on Sampling, Screening and Analysis of Persistent Organic Pollutants in Products and Articles* (UNEP, 2017g). The following studies may be referred to: An initial screening of HBCD has e.g. been performed in Japan for curtains⁸ (Kajiwara et al., 2008, 2009) and textiles in vehicles (Kajiwara et al., 2014). A preliminary monitoring of HBCD in extended polystyrene (EPS) and extruded polystyrene (XPS) has been performed in South Korea for packaging (Rani et al., 2014) and for buoy (Hong et al. 2013) detecting HBCD at different levels.⁹

⁸ The life span of quality curtains is more than 20 years (Wreys, 1997). Therefore, HBCD in curtains treated the last decades are to a considerable share still in use.

⁹ The levels were partly below HBCD levels used for flame retarding PS (Rani et al., 2014; Hong et al., 2013) indicating that some of the PS were produced from recycling.

2.4 STEP 3: COLLECTING AND COMPILING DATA

The main data that should be collected in the inventory, taking into account the whole life-cycle of the POP:

- (a) **Production of the POP or chemical preparations containing it.** This could mean e.g. chlordecone and the formulations containing it (pesticides with chlordecone as an active ingredient), or PFOS and formulations containing PFOS (such as fire-fighting foams and hydraulic fluids);
- (b) **Import of the chemical or formulations containing the chemical.** Most countries do not produce POPs themselves but import them as chemicals or chemical preparations;
- (c) **Import of products/articles consisting of, containing or contaminated with the POP.** These could include e.g. pallets treated with the POP pesticide, impregnated utility poles, textiles and upholstery, insulation materials, plastics, leather and apparel, synthetic carpets, and electronic and electrical articles and devices, depending on the chemical;
- (d) **Industries and other professional users** in the country using the POP as a chemical and their stockpiles of the POP;
- (e) **Industries in the country manufacturing** products and articles containing the POP and their stockpiles of the POP;
- (f) **Products/articles consisting of, containing or contaminated with the POP on the consumer market and in service** in the country. This could include e.g. insulation materials, electric and electronic devices, cars etc.;
- (g) **Existing obsolete pesticides** storage facilities;
- (h) **Waste streams** containing the POP and information on their management;
- (i) **Contaminated sites** as information becomes available.

The following quantitative information is sought:

- (a) Quantity of the chemical used in industrial processes and manufacture of products/articles;
- (b) Quantities of stockpiles;
- (c) Quantity of the chemical in products/articles in service;
- (d) Quantity of chemical manufactured in the country and/or imported;
- (e) Quantities of waste consisting of, containing or contaminated with the POP, as appropriate (see Basel technical guidelines for environmentally sound management of POPs waste for more information).

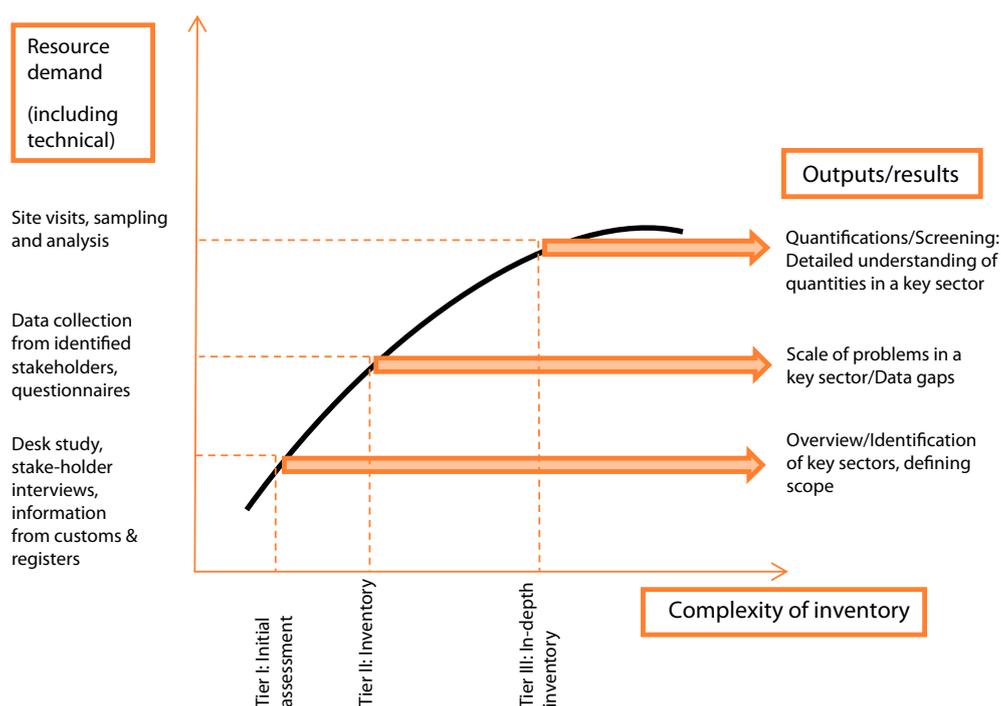
Collecting inventory-related data is a multi-step process that can be based on a tiered approach (Figure 1). This approach provides flexibility to Parties with varying priorities and capacities and allows for scaling of the work according to the findings.

An initial assessment (Tier I) is carried out to obtain an overview of the relevant uses and stakeholders to be contacted in the key sector under investigation. Tier I methods usually rely on available literature and statistics in combination with calculations based on already existing information, such as risk profiles and risk management evaluation documents adopted by the POPs Review Committee.

Main inventory (Tier II) will follow to generate data on the main sectors through interviews and questionnaires to the national stakeholders, and further identify missing information. This would also include actions such as desk study on pesticides storage facility contents.

If needed and resources are available, a more **in-depth inventory (Tier III)** can be initiated after evaluation of the data gathered in the main inventory. Higher tier methods involve more resource-intensive data collection activities and often also yield more accurate results. For some applications country- or region-specific actions could be considered e.g. in cooperation with regional centres.

Figure 1: The tiered inventory approach



2.4.1 Tier I: Initial assessment

The initial assessment relies on collecting “low-hanging fruit”, i.e. existing information, desk studies, literature searches, interviews etc. First priority is to get an overview of the present and historical use of the chemical and its life-cycle in the country for refining the scope and planning the inventory process:

- (a) Production;
- (b) Uses;
- (c) Waste management and potential recycling of materials containing the chemical;
- (d) Waste storages (mainly in case of obsolete pesticides);
- (e) Understanding the life cycle of POP and the potential for emissions.

Pesticide inventories

In the first step, the inventory team should clarify whether the pesticide is still produced and/or used, or would the inventory be only on waste. The team should screen the available information on the pesticide production and use in literature and information from national institutions working on plant protection and pesticides, pesticide industry and industry associations, pesticide trade, and internet searches using CAS numbers and trade names. The pesticide registry, potential food residue studies and all possible previous inventories should be reviewed. Although the existing inventories are unlikely to be sufficiently detailed for identifying the POPs, they may give information on the scale and location of waste sites.

If the pesticide is still in use, there might be production or import and even export, on which the national customs may have information. Further information should be sought by contacting the manufacturers, traders and marketers as appropriate.

Industrial chemical inventories

In the case of an industrial chemical, the inventory team can screen the available literature and information from national statistic institutions, published literature in scientific journals, technical reports or notes from industry and industry associations, commissioned research reports, and internet searches. An initial assessment should include national standards and regulations related to the chemicals in various applications. This could include, e.g. assessment of flammability standards for different applications in textiles such as transport seating, upholstery, carpets, curtains.

In the second step, the inventory team should contact the major stakeholders (larger companies, industry associations) to obtain initial information on whether the POP was or is used in the country. Special attention should be paid to those sectors where use may continue according to the Stockholm Convention provisions. The ministry of environment and the ministry in charge of industry, as well as the Stockholm Convention Regional Centres may have relevant information.

Information on the import of the chemical might be available from customs service, or industries using the chemical or their related industry associations. Information on both current and historic import and export should be sought. When contacting the stakeholders for the information, also information on the related uses should be asked.

Making rough estimations of the quantities used in any of the applications, e.g. the total volume of materials in a sector (e.g. vehicles), or a specific application (e.g. furniture upholstery) could be helpful to prioritize actions. Further information could be collected in Tier II and Tier III for verification.

The HS codes used by the customs are normally not specific enough to address a specific chemical or chemical in products/articles (Korucu et al., 2014). HS codes are likely not applicable for assessing import/export of certain POPs or products/articles containing them. CAS numbers and trade names should be used. For more information, see the *Guidance for the Control of the Import and Export of POPs* (UNEP, 2017g).

If information on import, manufacture and export of products/articles containing POPs are available, the net consumption can be calculated using the template below (separately for different sectors if preferable):

Net consumption of products in [country] = manufacture + import – export

Net consumption of POP in [country] = [manufacture + import – export] of POP containing products or articles x POP content*

* *In the absence of other values, please consult Risk Profile, Risk Management Evaluation adopted by the POPs Review Committee and the Basel Convention Technical Guidelines on ESM of waste for information on typical contents used in products/articles.*

For further examples, please see detailed POP inventory guidance documents.

Statistics on the manufacture of articles may not be detailed. The production statistics may not necessarily follow the same product codes as import and export. It may only cover some of the existing companies in the country. It is also expected that some statistical data on the manufacturing activities is confidential and not available. Therefore, the calculations based on the statistics must be carefully interpreted.

Authentic product information received from major companies, interviewed by the inventory team, in each relevant use sector is expected to be of a better quality and need to support the quantitative information from the statistics.

Based on these data, the team should assess the relevance of defined scope and whether the right stakeholders have been identified, before proceeding to the next Tier.

The data collected can be compiled using the compilation template in the appendix to the present guidance.

2.4.2 Tier II: Main inventory

It is likely that many questions will remain open after the initial assessment and the main body of information for the inventory will be achieved in the phase. The next Tier in the inventory focuses on specific sectors of interest identified based on the initial assessment. In Tier II, new and more detailed information is collected from the stakeholders through interviews, surveys and site visits.

Possible site visits and further studies could focus on the sites of production, use, and disposal of the POP in the country:

- (a) Current and former production sites;
- (b) Current and former disposal sites (such as pesticide storage facilities);
- (c) Users of the POP and products containing the POP;

- (d) Waste collection centres and recyclers;
- (e) End-of-life vehicles treatment facilities, if relevant;
- (f) Storage and disposal locations of materials containing the POP.

Information on the amount of production waste and the historic management and deposition of waste from these productions could be addressed in the inventory (including associated landfills).

Pesticide inventories

Pesticide inventories consist of identifying the current production and use, stockpiles and waste like with industrial chemicals. However, as many POPs pesticides have been phased out a long time ago, pesticide inventory could consist of just inventory of pesticide waste in the country. FAO has issued thorough guidance under Programme on the Prevention and Disposal of Obsolete Pesticides.¹⁰ Tier II inventory could be based on available documents at sites of storage. FAO guidance covers all aspects of pesticide management (FAO, 2001; FAO, 2010). However, it should be noted that with regards to the environmentally sound management referred to in Article 6 of the Convention, the technical guidelines by Basel Convention should be adhered to (UNEP, 2017e and the related POP specific technical guidelines).

If the pesticide is in use, information on the flows along the whole life-cycle must be acquired. In case sales data is not available, these data could be collected in Tier II by using targeted questionnaires to or interviews with producers, importers, agricultural advisory bodies, farmers' associations and NGOs.

Inventories of industrial chemicals

Some data collection methodologies were presented in Chapter 2.3. The inventory team could organise separate teams for different industrial sectors and hire consultants as appropriate.

The detailed guidance documents contain examples of questionnaires that could be used for contacting and requesting information from the stakeholders in different sectors that have been identified as relevant nationally in the initial assessment.

All the data formats including questionnaire survey formats should be carefully streamlined to ensure the consistency of the data collection as much as possible. If data conversions and estimations are done by stakeholders (e.g. for the management of confidential data), the inventory team may need to provide training on calculations on the POP content and how to fill out the questionnaire. This will ensure high data quality and consistency.

2.4.3 Tier III: In-depth inventory

In areas where Tier II search for information falls short from the objectives set for the inventory by the inventory team, focused information could be acquired through more resource-demanding techniques, if resources are available. The in-depth inventory could include using analytical methods to gain information e.g. on uses and concentrations of POPs in products/articles on the market to estimate the total amounts of POPs, prioritize actions and to estimate their costs.

The analytical methods may include measurements using the X-ray fluorescence (XRF) screening as well as laboratory analyses (see UNEP, 2017g). It may also involve detailed inspections of sites mentioned in Tier II. For pesticide inventories, in-depth inventory could entail sampling and analysing unidentified pesticides in storages of obsolete stocks.

¹⁰ <http://www.fao.org/agriculture/crops/obsolete-pesticides/prevention-and-disposal-of-obsolete-pesticides/en/>.

2.5 STEP 4: MANAGING AND EVALUATING THE DATA

The data need to be assessed for completeness and plausibility, possibly including a comparison with data from other countries in the region. Data gaps may (partly) be filled by extrapolation of available statistical data. If the quality of the data is considered unsatisfactory, additional data collection or screening (Tier III) should be undertaken.

2.5.1 Data management

Data collection methodologies applied in the data gathering process as described in Chapter 2.3 may vary depending on the legal framework, political organization and economic support for environmental management. Nevertheless, the management of the collected data should be consistent and transparent. During the data processing, all the assumptions and conversion factors adopted as a result of expert judgment, where needed, should be noted/recorded and referenced when the results are presented.

2.5.2 Evaluation of the inventory

Some challenges may still exist at the end of the inventory including a lack of detailed information on certain activities and applications. An evaluation of the process, strategy used and information collected can take place along with a decision on what further actions are needed to make the inventory more complete.

The evaluation includes identification of the following:

- (a) Gaps and limitations;
- (b) Need for validation of the information compiled in the inventory;
- (c) Actions needed to meet the requirements of the Stockholm Convention.

Important elements in this evaluation step are to identify any gaps and limitations, and the measures needed to make the inventory more complete. Other ways to involve the stakeholders and other data collection strategies (see Steps 2 to 4) could then be considered. A gap analysis in the evaluation of the initial assessment or preliminary inventory could result in the need to contact some of the stakeholders again to get more information or identify other stakeholders to be contacted to help fill the gaps.

For inventory sectors with limited information, information campaigns and stakeholder meetings or workshops may be necessary. In some cases, government regulations may be required to ensure that stakeholders report their holdings and cooperate with the national authorities and engage in the national inventory. To be noted that drafting a regulation and making it come into force can sometimes require.

Gaps, limitations and necessary actions to complete the inventory will also be valuable information for the NIP, especially for developing countries with need of financial support for their inventory. It is important for developing countries to identify whether and what kind of technical and financial support will be necessary to complete the inventory. Even if the inventory is very incomplete, the NIP is expected to provide information on gaps and the limitations of a country's resources and capabilities – information that is useful to identify appropriate technical and financial needs.

It is also important to consider whether the current situation meets the requirements of the Convention, including the potential actions proposed in the NIP especially with regard to the elimination of the POP and compliance with the acceptable purposes or specific exemptions. Information on BAT/BEP measures may also be useful.

The inventory might also require revision at a later stage when the action plan is updated. This can also be done using the strategies described in this guidance.

Gap analyses conducted in the evaluation of an inventory could result in the need to contact some of these stakeholders again to get more information or identify other stakeholders to be contacted to help fill in the information and data gaps.

2.6 STEP 5: PREPARING THE INVENTORY REPORT

The final stage of the inventory is preparation of the inventory report. This report includes results of inventories of all key sectors investigated by the country compiled in a single document.

The essential elements of the report are:

- (a) Objectives and scope;
- (b) Description of data methodologies used and how data were gathered, including all the assumptions and conversion factors adopted as a result of expert judgment;
- (c) Final results of the inventory for each sector considered a priority for the country (using a format to be provided in this guidance, as such or adapted from that format);
- (d) Results of the gap analysis and limitations identified for completion of the inventory;
- (e) Further actions (e.g. stakeholder involvement, data collection strategies) to be taken to complete the inventory and recommendations.

Other information (e.g. stakeholder list) could be included in the report depending on the national preferences.

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APPENDIX: EXAMPLE OF A TABLE COMPILING THE BASIC INVENTORY INFORMATION

Relevant parts depend on the chemical.

Production, import and export				
	kg/year		Historical total	
Production of the chemical in the country				
Import of chemical				
Export of chemical				
Industrial use of the chemical in the country				
	kg/year		Historical total	
Application A				
Application B etc.				
Stockpiles in the industry using the chemical for industrial use				
	kg			
Company A Company B etc.				
Use in production of products and articles containing the POP				
	kg/year	Concentration % w/w	Articles kg	Historical total
Article A/Company A Article B/Company B etc.				
Stockpiles in the industry using the chemical for industrial use				
	kg			
Company A Company B etc.				
Amounts of products and articles in service (estimate for future waste management)				
	Total kg			
Article A/Company A Article B/Company B etc.				
Amount of waste annually				
	kg	Management		
Article A Article B... etc.				

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