NATIONAL IMPLEMENTATION PLAN

FOR PERSISTENT ORGANIC POLLUTANTS IN TURKEY

2022

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1. Introduction

1.1. Persistent Organic Pollutants (POPs) and International POPs regulations

Persistent Organic Pollutants (POPs) are the chemicals that can remain in the environment for a long time without undergoing any kind of degradation, be transported long distances, bioaccumulate in the food chain and have significant adverse effects on the environment and human health. Since these chemicals are subjected to long range transport, they can even be detected in areas which none of these chemicals are produced or used. Hence, they pose a high risk not only nationwide but also worldwide.

POPs are a subject of broad international interest on the global and regional scales. The Stockholm Convention on Persistent Organic Pollutants (SC) is a global treaty focused on the protection of human and environment against POPs. Very important regional activities are connected with the Convention on the Long Range Transboundary Air Pollution (CLRTAP) of the United Nations Economic Commission for Europe (UNECE) and its POPs Protocol. All of these conventions aim to evaluate the problems related to similar types of chemicals; such as pesticides, industrial chemicals and by-products, classified as POPs due to the characteristics listed below:

- Persistency in the environment for long periods of time (due to the stable structure, resist to undergo any photolytic, biological and chemical reactions),
- Semi-volatility (wide distribution throughout the environmental compartments, water, soil and air, hence subject to long range transport);
- Accumulation in the lipids of living organisms and
- Toxic effects on humans and wildlife.

POPs can be separated to 3 groups by their characteristics and areas of use which are pesticides, industrial chemicals and unintentionally produced POPs. They can also be separated to 3 different groups by considering the annexes of convention. Table 1 lists the POPs with their areas of use and assignment to SC Annexes A, B and C. Some additional information about the SC POPs are summarized in the Annex I.

Table 1: The list of SC and CRLTAP POPs

Stockholm Convention			
Annex A (Elimination)	Aldrin	Chlordane	Chlordecone
	Decabromodiphenyl ether (commercial mixture, c-deca-BDE)	Dicofol	Dieldrin
	Endrin	Heptachlor	Hexabromobiphenyl
	Hexabromocyclododecane (HBCDD)	Hexabromodiphenyl ether and heptabromodiphenyl ether	Hexachlorobenzene (HCB)
	Hexachlorobutadiene	Alpha hexachlorocyclohexane	Beta hexachlorocyclohexane
	Lindane	Mirex	Pentachlorobenzene
	Pentachlorophenol and its salts and esters	Polychlorinated biphenyls (PCB)	Polychlorinated naphthalenes
	Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds	Short-chain chlorinated paraffins (SCCPs)	Technical endosulfan and its related isomers
	Tetrabromodiphenyl ether and pentabromodiphenyl ether	Toxaphene	
Annex B (Restriction)	DDT	Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride	
Annex C (Unintentional production)	Hexachlorobenzene (HCB)	Hexachlorobutadiene (HCBD)	Pentachlorobenzene
	Polychlorinated biphenyls (PCB)	Polychlorinated dibenzo-p-dioxins (PCDD)	Polychlorinated dibenzofurans (PCDF)

	Polychlorinated naphthalenes		

POPs Protocol CLRTAP			
Annex I (Elimination)	Aldrin	Chlordane	Chlordecone
	DDT	Dieldrin	Endrin
	Heptachlor	Hexabromobiphenyl	Hexachlorobenzene
	Hexachlorobutadiene	Hexachlorocyclohexanes	Hexabromodiphenyl ether and heptabromodiphenyl ether
	Mirex	Tetrabromodiphenyl ether and pentabromodiphenyl ether	Pentachlorobenzene
	Perfluorooctane sulfonate (PFOS)	Polychlorinated biphenyls (PCB)	Polychlorinated naphthalenes (PCN)
	Short-chain chlorinated paraffins (SCCPs)	Toxaphene	
Annex II (Restriction)	DDT	Hexachlorocyclohexanes	Polychlorinated biphenyls (PCB)
	Perfluorooctane sulfonate (PFOS)	Short-chain chlorinated paraffins (SCCPs)	
Annex III (Reduction of emissions)	Polyaromatic hydrocarbons (PAHs)	Polychlorinated dibenzo-p-dioxins (PCDD)	Polychlorinated dibenzofurans (PCDF)
	Hexachlorobenzene	Polychlorinated biphenyls (PCB)	

1.2. Stockholm Convention

Stockholm Convention is an international convention which primarily aims to protect human health and the environment by promoting Parties to the Convention to take precautions for the elimination or reduction of POPs releases. The convention was signed by 125 countries including Turkey on the 23rd of May 2001 in Stockholm regarding 12 POPs called dirty dozen. SC is effective by May 17th 2004 and 185 countries or local institutions are Parties to the Convention as of 2022. Convention is focused to eliminate (Annex A), restrict (Annex B) the production and use, and reduce the unintentional release (Annex C) of first 12 POPs since the date it is first effective on and 18 additional POPs are listed since then (Table 1).

1.3. CLRTAP & POPs Protocol

The UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP) was the first international treaty to deal with air pollution on a broad regional basis. The Convention entered into force in 1983, aiming at an international cooperation for air pollution abatement including long range transboundary air pollution and setting up an institutional framework which has brought together research and policy.

The executive body adopted the Protocol on POPs in Aarhus (Denmark) on 24 June 1998. It focuses on a list of 16 substances that have been singled out according to agreed risk criteria. The substances comprise eleven pesticides, two industrial chemicals and three by-products/contaminants. The Protocol bans the production and use of some products, as well as some others scheduled for elimination at a later stage. The Protocol includes provisions for dealing with the wastes of products that will be banned. Furthermore, the Parties revised obligations for DDT, heptachlor, hexachlorobenzene and PCBs as well as emission limit values (ELVs) for waste incineration. In addition, to facilitate the Protocol's ratification by countries with economies in transition, the Parties introduced flexibilities for these countries regarding the time frames for the application of ELVs and best available technologies (BAT).

1.4. EU Regulations

The EC POPs regulation is the implementing legislation in the EU Member States of the SC. It is also the implementing legislation for the 1998 POPs Protocol of the 1979 UNECE

CLRTAP. EC POPs Regulation (No 2019/1021) aims to protect human health and environment from POPs through the measurements under the following legislations:

- Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) contains provisions specifying how substances should be assessed with regard to their POPs characteristics. Under REACH, the production and use of substances exhibiting POP characteristics can be prevented and new POPs candidates can be identified.
- Regulation (EU) No 649/2012 concerning the export and import of dangerous chemicals (PIC Regulation).
- Council Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT). This Directive aims to completely dispose of PCBs and equipment containing PCBs as soon as possible and equipment with PCB volumes of more than 5 litres before the end of 2010. It also sets requirements for the environmentally sound disposal of PCBs.
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures, amending and repealing (CLP).
- Directive 2010/75/EC on industrial emissions (integrated pollution prevention and control) (IED. The IED lays down control measures to reduce emissions of unintentionally produced POPs by covering the major industrial stationary sources of these POPs.
- Directive 2000/76/EC on the incineration of waste (WID). The WID Directive covers all waste incineration facilities that are a very important source of POPs by-products. In particular it sets strict limits for emission rates of dioxins / furans in the air.
- Directives or Regulations concerning the evaluation and management of the dangers/risks associated with chemical substances.
- Further Directives – E.R.A. of new pharmaceuticals.

1.5. Turkish National Implementation Plan of the SC

Turkey has signed the Stockholm Convention on POPs on May 23rd 2001 and it has been approved by the Turkish Grand National Assembly as 5871 numbered Law (14.04.2009, No.27200), then published on July 30th 2009 as approved by the Council of Ministers (30.07.2009, No.27304). The Convention is officially effective since January 12th 2010.

As stated by the Article 7 of the Convention, Turkey prepared the first NIP between 2004 and 2006 funded by GEF and revised it in 2010, submitted to the Stockholm Secretariat in 2011 which included initial 12 POPs issues of concern like uses, import, export, production, distribution in country and source related inventory, current stockpiles and its disposal options assessment, contaminated sites, POPs chemicals related infrastructure, legal instruments, monitoring, research and development capacity, monitoring system establishment and use. The first plan was reviewed and updated, in accordance with the responsibilities to the Convention, by funding with GEF on capacity building between the years 2012-2013. Later, in the framework of an EU Project, it is revised in order to cover CLRTAP/POPs Protocol and EU POPs Regulation in 2013-2015. Under this project, in addition to NIP revision, LGA, draft by-law, RIA and SIA were prepared. The NIP Update is submitted to the Stockholm Secretariat in 2016 which included the inventory, current stockpiles, contaminated sites, legal instruments, monitoring, research and development capacity, and action plans related to initial and new POPs according to Annex A, B and C.

2. Country Profile

2.1. General Information

Turkey or Republic of Turkey in official name is a country, located in both in Europe and Asia and its capital is Ankara. Country's land is located in Anatolia peninsula and Thrace which is an extension of Balkan Peninsula. Country is surrounded from 3 sides by Mediterranean, Black Sea, Aegean Sea and Sea of Marmara which is between Black Sea and Aegean Sea. Neighboring countries are; Greece, Bulgaria, Georgia, Armenia, Azerbaijan, Iran, Iraq and Syria.

Governmental and Executive Structure

Turkey is a democratic, secular, centralist and constitutional republic. President of Republic is the president of the country and elected with the direct selections in five year periods. Turkey is governed by the President holding the executive power; Turkish Grand National Assembly holding the legislative prerogative and Courts holding the jurisdiction. Turkish Grand National Assembly consists of 600 parliamentarians and they are elected in 5 year-periods.

Biggest administrative departments are provinces and there are 81 of them. A province consists of city centrum, counties and the villages appurtenant to the counties. Government assigns Governors who are in charge of administration and execution in the province. Turkey is separated to 7 Geographic Regions however; no administrative structure is represented by these regions.

The additional country information is presented in the Annex II.

2.2. Legal and Institutional Framework Regarding Environmental Policies

2.2.1. Turkey's Environmental Policy and Strategies

The first constitution that mentions environment is the Turkey's 1982 Constitution. The Constitution's most important article regarding environment is Article 56. According to Article 56, "Living in a balanced and healthy environment is a prerogative. Improving the environmental status, protecting environmental health and preventing environmental pollution is the duty of both the government and citizens" (1982 Constitution, http://www.anayasa.gen.tr/1982ay.htm, 20.04.2020). Environment prerogative concept is first mentioned in Article 56 and is protected under the article.

The general framework of protection of the environment and improvement of its status is established by the Environmental Law. Environmental Law (2872) issued on August 11th 1983 based on the 1982 Constitution's Article 56, aims to establish a legal framework on protecting the environment, preventing environment from pollution or deterioration, rehabilitation of the environment from any former pollution, improving the environmental status, using the natural resources and energy efficiently, reduction of the waste amount at the source generated as a result of an activity and recovery of the waste generated via using

environmentally sound technologies, regulating and taking measures to sustain the good status of the environment to reserve its integrity for the next generations.

Law on Amendments on the Environmental Law (5491) was published in the Official Gazette (26167) on May 13th 2006. The new 5491 numbered Law had many other regulation and definitions that were not addressed in the initial 2872 numbered Environmental Law. The Law focused on the key issues in protection of the environment and regulations compatible with the international agreements also makes an emphasis on adoption of a sustainable development policy.

In Turkey, the first National Environmental Strategy, consistent with the development plans, the EU Integrated Environmental Harmonization Strategy (IEHS) for the years 2007-2023 has been prepared within the framework of harmonization obligations with EU. The IEHS contains detailed information on the technical and institutional infrastructure, compulsory environmental amendments and regulations that has to be addressed to implement and comply with EU environmental acquis which is a prerequisite for Turkey to join EU. To achieve this, IEHS initially stated the goals to achieve, strategy and activities planned on control of water, soil, air pollution originated from wastes and industries, protection of nature and environment which is a horizontal plane affected by any activity. In this framework, the total amount of investment (except chemical and noise) is estimated as 59 billion Euro in environment to fully comply with EU environmental standards. The 20% of the total investment is considered to be invested by the private sector and the rest is considered to be by the public sector.

2.2.2. Roles and responsibilities

Authority concerning to environmental matters are divided between the central and local government. Ministry of Environment, Urbanization and Climate Change and Climate Change has the authority on chemicals management. Responsibilities of the MoEUCC are:

- to coordinate policies and strategies regarding education, research, project design and action plans for prevention of environmental pollution, development of standards and benchmarks, determination of measurement, detection and quality criteria;

- To determine the criteria for air pollution, noise and vibration related to waste and chemicals that have negative effects on the environment throughout the country.
- To determine the economic tools and develop standards in order to carry out an effective environmental management, and to ensure compliance of waste and chemicals with the environment.
- To determine and implement the procedures and principles regarding the prevention and control of pollutants with the purpose of protecting groundwater, surface water and soil, to develop emergency response plans, to determine the appropriate technologies in order to protect the environment and accordingly to take necessary precautions.
- To determine the goals, policies and benchmarks for the management of waste and chemicals.
- To determine policies and strategies and to develop legislation on the waste minimization at the source, classification, collection, transportation, temporary storage, recovery, disposal, reuse, treatment, conversion to energy and final storage of wastes.
- To determine, apply and monitor the principles regarding the transportation of wastes and licenses for hazardous wastes in cooperation with the relevant institutions and organizations, to determine the current pollution status of the sites contaminated with waste and chemicals, to carry out studies related to the risks to the environment and human health and remediation of contaminated sites.
- To determine the criteria for the import and export of fuel, waste, chemicals and other substances to be banned and restricted and to ensure the implementation of these criteria.
- To prepare, execute and coordinate national environmental strategy and action plans.
- To coordinate with other institutions and organizations in order to determine plans, policies and strategies for taking precautions related to global climate change and ozone depletion.

Responsibilities of other institutions that have a role in the preparation of the NIP and POPs NIP are described in Table 2.

Table 2: Responsibilities of institutions that have a role in the preparation of the NIP and POPs NIP

Institution	Responsibility
Ministry of Environment, Urbanization and Climate Change	Main account institution, the competent authority and the National Focal Point (NFP) of Turkey for Stockholm Convention. Drafting and preparing legislation on POPs, performing, monitoring and coordinating activities on POPs
Ministry of Foreign Affairs	authorization and submitting the ratification instruments to relevant bodies of the international treaties and conventions in different ways as required by international laws or practices to prepare original or copy of all documents
Ministry of Agriculture and Forestry Affairs	coordinating and controlling the national water resources management (deriving the quality standards for POPs in water and monitoring and controlling of pollution caused by POPs in water resources) and creating policies for protecting water resources for sustainable use of water and also controlling, regulating and monitoring the licensing, production, import, export, sales, use, storage and old stocks of plant protection products including POPs pesticides
Ministry of Industry and Technology	determining industrial strategies and aims by constituting industrial committees and monitoring the studies on these subjects, and controlling the production of articles and

	goods made by industrial chemicals which are related to the Ministry's scope of its authority
Ministry of Trade	ensuring top legislative harmonization between the product safety, technical regulations, technical obstacles, technical suitability assessment and monitoring of the applications and adapting the technical legislations related to the products working in coordination with relevant institutions to the foreign trade and also determining the regulatory principles of product safety, import and export of chemicals
Ministry of Energy and Natural Resources	supervising the chemical waste and the equipment used in distribution and production of electricity and taking relevant precautions on the subject
Ministry of Health	developing sectoral health policies, implementing national health strategies, investigating the effects of chemicals on human health after short and long term exposure
Ministry of Family and Social Services	monitoring of occupational health and safety issues, auditing, policy development and planning, developing health and safety units and certifying the practices and also determining the rules and principles of working with chemicals and the measures necessary for the prevention of industrial accidents

Ministry of Transport and Infrastructure	controlling the transport of the chemicals
Ministry of National Education	conducting public awareness and education activities
Presidency of the Republic of Turkey	the final approval of the international conventions as well as Stockholm Convention on POPs
Presidency of Strategy and Budget	determination of development and public investment policies regarding chemicals and environment and its coordination during implementation

2.2.3. Agreements/Conventions Related with POPs

Stockholm Convention on POPs

Turkey has signed the Stockholm Convention on POPs on May 23rd 2001 and it has been approved by the Turkish Grand National Assembly as 5871 numbered Law (14.04.2009, No.27200), then published on July 30th 2009 as approved by the Council of Ministers (30.07.2009, No.27304). The Convention is officially effective since January 12th 2010.

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

Turkey has signed the Basel Convention on March 22nd 1989 and it has been approved by the Turkish Grand National Assembly on June 22nd 1994. The Convention is officially effective since September 20th 1994.

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

Turkey has signed the Rotterdam Convention on September 11th 1998 and the Convention is effective since 2004. Turkey became a party to the Convention on December 2017.

Convention on Long-Range Transboundary Air Pollution (CLRTAP)

CLRTAP is approved by the 2667 numbered Law on April 28th 1982 and published on March 23rd 1983 Official Gazette. Protocol on Long-term Financing of the Cooperative Programme

for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) is approved on June 3rd 1985 and published in the Official Gazette on July 23rd 1985. The protocol is effective internationally since January 28th 1988. Total emission of 4 parameters (SO_2, NO_x, NMVOC, NH_3) should be reported to European Environment Agency (EEA), The United Nations Economic Commission for Europe (UNECE) Secretariat and EMEP. There are 8 protocols under CLRTAP:

- Protocol to Abate Acidification, Eutrophication and Reduction of Ground-level Ozone,
- Protocol on Persistent Organic Pollutants (POPs),
- Protocol on Heavy Metals,
- Protocol on Further Reduction of Sulphur Emissions,
- Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes,
- Protocol concerning the Control of Nitrogen Oxides or their Transboundary Fluxes,
- Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes,
- Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent

The United Nations Framework Convention on Climate Change (UNFCCC)

Turkey has been aware of the environmental and socio-economic consequences of climate change, hence; it has taken the initiative to reduce the Greenhouse Gases (GHGs) and made international collaborations. At the 7th Conference of Parties (COP) of UNFCCC, Turkey was listed as an Annex 1 country and the Parties invited Turkey to acknowledge the special conditions which is different from the rest of the Annex 1 countries. After this decision, Turkey has become a Party to UNFCCC on May 24th 2004 and on August 26th 2009 Turkey has become a Party to the Kyoto Protocol. Even though Turkey has no obligation to reduce the emissions within the scope of the Kyoto Protocol, it has addressed the issues like energy efficiency, renewable energy resource use encouragement, reduction of emissions originating from waste and transport sectors. Moreover, Turkey is still working eagerly on the dissemination of voluntary emission market and integration of mandatory emission market.

Montreal Protocol on Ozone Depleting Substances (ODS)

Turkey ratified and became a Party to the Vienna Convention for Protection of Ozone layer and Montreal Protocol on Ozone Depleting Substances (ODS) in 1991. MoEUCC is the focal point for the Protocol and fulfills the duties and responsibilities such as following the national and international studies on the subject. Moreover, the processes related to ODS in the country (from import to use) is monitored under the "Programme of ODS Tracking" since 2009.

2.2.4. Legal Framework on POPs

As a Party to the SC, there are a number of regulations and legislations adopted and implemented on POPs in order to comply with the Convention's liabilities. The By-Law on Persistent Organic Pollutants by MoEUCC entered into force on November 14th 2018 (No. 30595). It sets principles for

- implementing and enforcing the provisions of Stockholm Convention,
- prohibiting the production, placing on the market and use of POPs,
- restricting and gradually eliminating POPs,
- reducing of POPs releases,
- managing the wastes containing POPs.

Additionally, Draft By-Law on Export and Import of Some Hazardous Chemicals which is aimed to implement and enforce the provisions of Rotterdam Convention and set the principles of Prior Informed Procedure in international trade of chemicals including POPs is foreseen to be published and entered into force in 2022 by MoEUCC. The rest of the regulations and legislations related to obligations of the SC are presented in Annex III.

2.3. Inventory of POPs – status in Turkey

2.3.1. Chemicals listed under Annex A of the Conventions

2.3.1.1. Pesticides and HCB

Licensing process for pesticides is carried out by Ministry of Agriculture and Forestry Affairs. Pesticides listed under Annex A of the Conventions are either licensed and banned (aldrin, chlordane, DDT, dieldrin, heptachlor, endrin, toxaphene, lindane, α-HCH, β-HCH,

endosulfan) or never been licensed and used in Turkey (mirex, chlordecone, pentachlorobenzene, HCB). Among the pesticides recently listed in the Stockholm Convention, dicofol has neither produced nor licensed in the country, hence it has no stock. However, pentachlorophenol and its salts and esters were imported in the country even if the amounts were very low (Table AIV/1).

2.3.1.2. Hexabromobiphenyl (HBB) and Polychlorinated biphenyls (PCBs)

HBB has been banned for a long time ago in Turkey, like many other countries in the world, hence is not used.

PCBs were never produced in Turkey but imported either within equipment or as in the oil form. The first inventory for PCBs was made in 2007 (NIP, 2010) and the inventory update was conducted in 2012-2013 (NIP, 2016). Almost 60% of PCB-containing materials were eliminated until 2016 (NIP, 2016). During implementation of the POPs Legacy Elimination and POPs Release Reduction Project (No.140288) funded by GEF and cooperated by MoEUCC, UNDP and UNIDO, 300 tonnes of PCB containing materials and equipment was eliminated, and 6094 transformers were analysed for PCBs. According to the results of this analysis, 42,6 tonnes of transformer oil having a PCB concentration greater than 50 ppm were decontaminated.

2.3.1.3. Polybrominated diphenyl ethers (PBDEs)

Since the twentieth century, manufacturers began to replace traditional materials such as wood, metal, and wool with petroleum-derived products such as plastics and polyurethane foam. These new “treated” materials are either less flammable or slowed down the rate of fire growth. The latter is achieved by treating the materials by flame retardants, mainly brominated (BFRs). Polybrominated diphenylethers (PBDEs) are one from the mostly frequently used group of brominated chemicals used as flame retardants and hence widely used in items that are susceptible to catch or sustain fire such as plastic in electronic devices, polymers in automobile, certain synthetic textiles and polyurethane foam in certain applications.

In May 2009, tetrabromodiphenyl ether, pentabromodiphenyl ether (components of commercial pentabromodiphenyl ether, c-pentaBDE) hexabromodiphenyl ether and heptabromodiphenyl ether (components of commercial octanbromodiphenyl ether, c-octaBDE) were included in the Stockholm Convention which prohibits production, use, import and export. Later, in 2017 decabromodiphenylether (main component of commercial c-decaBDE) was also added to the Annex A of Stockholm Convention.

Inventory of c-PentaBDEs and c-OctaBDEs

c-OctaBDE has been used in EE (and hence also seen in WEE) and in plastics vehicle parts (steering wheels, dashboards, door panels, etc.). Only a portion of the cars produced between 1975 and 2005 worldwide have been treated with c-PentaBDE. It is estimated that about 35% of the approximately 100 000 tons c-PentaBDE production has been used in the transport sector (Alcock et al. 2003, UNEP, 2010a, 2010b). Thus, the transport sector is one of the large material flows of goods and ultimately becomes a large waste and recycling flow. Moreover, the end-of-life management of the transport sector is a highly relevant material flow for the recovery of materials and for managing pollutants (Vermeulen et al., 2011).

The c-PentaBDE inventoried in this 2012-2019 period in transport sector is presented in Table AIV/2. The expected ratios, percentages of c-PentaBDE were all taken from guide of the Stockholm Convention on POPs regarding PBDE. Among the assumptions given in the guide, 160 g c-PentaBDE / car, and /truck; 1 kg c-PentaBDE per bus, and 0.5 kg / minibus are used, which was the same approach followed in the previous NIP update of Turkey. Then this c-PentaBDE were distributed to by 32% to tetraBDE, 56% to pentaBDE, 9% to hexaBDE, and 0.5% to heptaBDE.

The POP-PBDEs in vehicles currently in use was calculated through obtaining the number of vehicles on traffic in 2018, corresponding to the models produced before 2005, as in these vehicles a certain c-PentaBDE constituent is assumed. There were 4 different vehicle categories as car, truck, mini/midibus and autobus. For truck, mini/midibus and autobus, 0.05 regional constant was used to find c-PentaBDE as their import from United States was quite low. For automobile, judging from the import numbers, 10% of the cars were assumed to

come from US and they were separately calculated with a 0.5 regional constant, then summed up with the rest.

Unlike previous NIP, in this report only the last year's import numbers and predicted maximum amount of POP-PBDEs within them was calculated using TURKSTAT's Foreign Trade Statistics (Special Trade System) [with 12 numbered HS codes of 870120900000, 870210191100, 870210191200, 870210191300, 870210991100, 870210991200, 870210991300, 870321901000, 870322901000, 870323901100, 870323901200, 870323901300, 870324901000, 870331901000, 870332901100, 870332901200, 870332901300, 870333901011, 870333901012]. The reasons are twofold, the first one is previous years' imports were already included in the currently in use number. The second reason is that, although the number of vehicles produced in different years (a.k.a. vehicles model years) in currently in use vehicles is known, there is no such separation for imported vehicles. This makes it hard to account for PBDE imported if it is to be calculated through all previous years since only <2005 models should be considered. This approach already covers <2005 model imported vehicles for up to 2018 currently in use safely, and the additional 2019 import data comes from the import database. Nevertheless, imported vehicles for 2019 is very low in number, so even the maximum amount of possible PBDEs in it was calculated as no more than 1.344 kg. This decline in the number of imported vehicles can be seen in the following Figure 1.

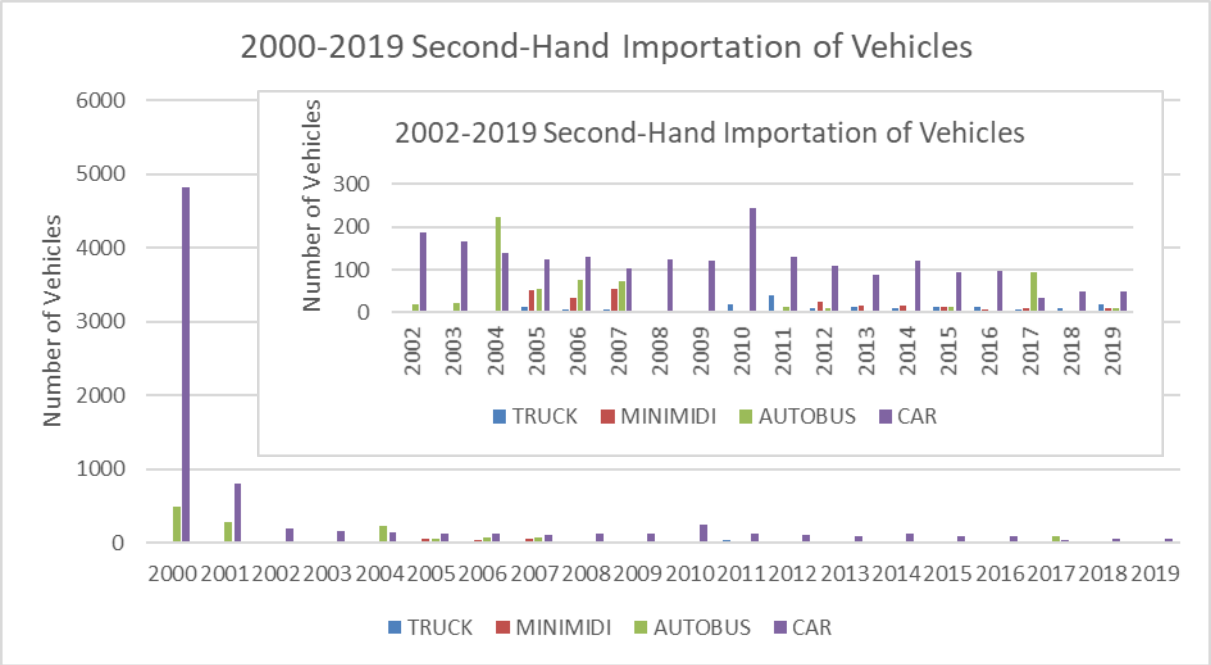

Figure 1: Second-hand vehicle imports of Turkey between years of 2000-2019

For the end-of-life vehicles and corresponding PBDEs, the data was taken from deregistered vehicles for every year from TURKSTAT database. Only the vehicles between 2012-2019 were considered since those for the years before 2012 were already included in the previous inventory. Even though there is no model year of deregistered vehicles, it was assumed that all of them comes from 1975-2004 production line as mostly these vehicles would be ELV in between 2012-2019 and it will make a conservative estimation of PBDEs.

The estimated values of recycled PBDE and disposed PBDE via ELV were also calculated over total deregistered vehicles. In addition to the total PBDE in all these ELV; between 2012-2019, the data of ELV separated for recycle were evaluated. Since the total number of mini/midibuses and cars for recycled number of ELVs are available, their separation was estimated through their ratio in deregistered number of vehicles in the corresponding year. Subsequently, 160 g/vehicle for car and 500 g/vehicle for mini/midibuses were used for c-PentaBDE estimation. After the estimation of recycled amount, the rest of the ELV total PBDE was attributed to disposed of PBDEs.

Except currently in use vehicles PBDE content, all these values were lower compared to the previous NIPs inventoried PBDE. This is because the number of <2005 model vehicles in use also increased. The decline in the rest was expected since the more >2005 model year vehicles were used and then deregistered, the less c-PentaBDE will be in these vehicles. Another contribution to this decline is that most of the imported vehicles came from non-US and European Countries, where c-PentaBDE use was already low and prohibited after 2005. Additionally, the ratio of recycled/disposed is quite higher than that of the previous NIP calculation. This in turn comes from the fact that more effort was put into the recovery and recycle of ELVs than before. However, there is one additional point of recycled amount of PBDE that, before the recycle, ELV's might be depolluted from these possibly PBDE containing parts, which effectively reduce the recycled PBDE.

For the estimation of the inventory of electrical and electronic equipment containing PBDEs, Tier 1 approach was chosen. Countries that have not yet established an EEE/WEEE inventory could initiate the inventory by estimating the minimum POP-PBDEs amount in CRT in the country. This requires estimating the country's penetration rate (number of appliances per capita) in analogy to countries with similar economic development and consumer behavior, and then extrapolating from the per capita data to the target country. Once the per capita data have been estimated, the POP-PBDEs content in CRT casings (TVs and computer monitors) can be calculated taking into consideration the following additional data:

- Population of the respective country;
- Weight of the CRTs: 25 kg per device (estimated average weight of a CRT monitor, either TV or PC monitor);
- Polymer content of CRT casings: 30% (estimated average);
- A range of c-OctaBDE content, 0.87-2.54 kg/ton, for these polymers used in CRT casings (estimated average).

A range of c-OctaBDE in CRT devices can be calculated as follows: MPBDE(i) = [Number of CRTs/capita^{Region}] x population x 25 kg x 0.3 x [0.00087 to 0.00254] Where: MPBDE(i) is the amount of POP-PBDEs (i) in [kg] (in Polymer (k) of electrical and electronic equipment (EEE) (j)). The POP-PBDEs (heptaBDE and hexaBDE) in the c-OctaBDE can be calculated

according to the homologue content (of c-OctaBDE, the heptaBDE homologue is estimated as 43% and the hexaBDE as 11%). Number of CRT/ person can be taken from Asian average value of 0.17 (Gregory, 2009). The population of Turkey in 2019 was calculated as 83,154,997 people. As a result, the estimated c-OctaBDE content from CRT monitors in Turkey ranges between 92,200 and 269,300 kgs (Table AIV/3). c-OctaBDE inventoried in CRT monitors in Turkey between years 2013 and 2020 were also estimated and presented in Table AIV/4.

Compared to the previous NIP, the POP-PBDEs imported via CRT monitors is extremely low, which was expected since these values reflect the import in 2019-2020 only, instead of what was up to 2013 as in previous case. The previous years' import values were already included in the POP-PBDEs in stocks (Table AIV/4). CRT monitors are currently not preferred in the presence of plasma and LCD monitors, so understandably their import values declined, as can be seen in Figure 2.

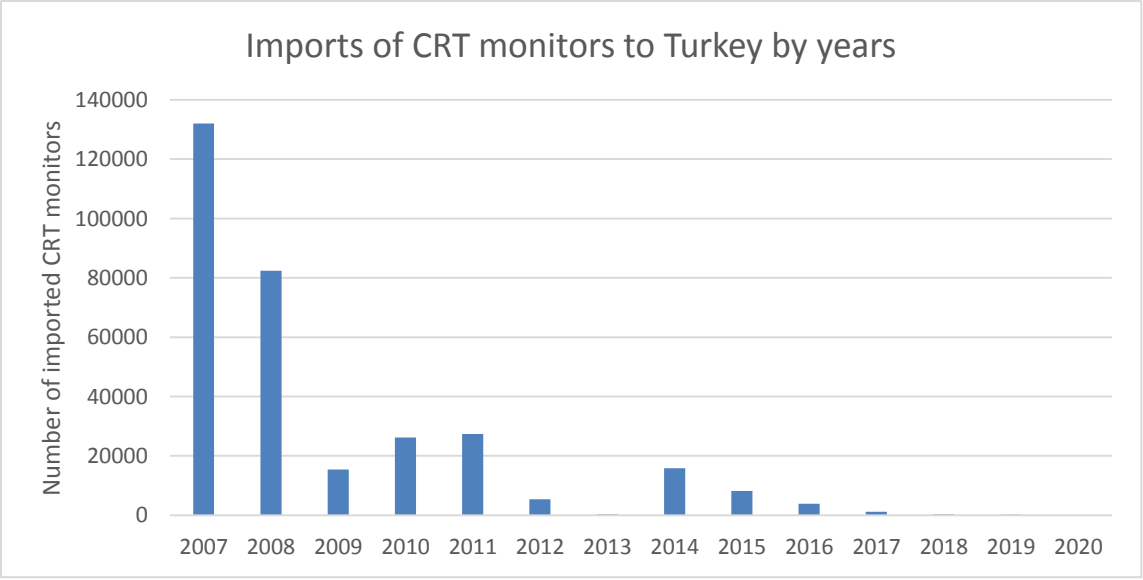

Figure 2: CRT monitor imports to Turkey between 2007-2020 years

To generate the import values, CRT related HS codes of 852841, 852842, and 852849 were used. Unlike in the previous NIP, it is not assumed that imported computers include CRT monitors, as it would not reflect the reality of the current time. To sum up, imported PBDE via CRT is very negligible for the period of 2013-2020.

The PBDE-POPs in stocks were estimated by using the most up-to-date population, and a regional constant of 0.17 and 0.00087 tons of c-Octa-BDE application to 1 ton of polymers, ~92 tons of c-OctaBDE were expected. This is a highly conservative number as probably the regional constant of 0.17 for Asian region is not the current ratio of CRT monitors / capita. This number might be updated in the final report in case of a newer regional or relevant constant. With this calculation, it is lower than the amount found in the previous NIP as 168 tons, but as explained, low margin of PBDE to polymer application, i.e. 0.00087 tones, was used in the current case. In case of higher margin use, the amount would be 269 tones. This higher number was not used at this time since CRT is not the preferred monitor for either TVs or computers anymore.

The CRT monitors entering the waste stream, and the corresponding PBDE in waste were calculated by dividing this stockpile by 8, as suggested by the Guide for PBDE inventory with the assumption of 8 years of life. It was expected that this number would be lower than that of previous NIP since there will be less and less amount of PBDE contained in CRT and correspondingly there will be less waste.

The last variable, POP-PBDEs recycled via polymers obtained from waste CRT was calculated. The European Waste Catalogue numbers of 20-01-35 for household and 16-02-13 for industrial scale monitors were used to retrieve recycled polymers. The weakness in this calculation is that these codes also include LCD and plasma monitors, so the resulting number for PBDE estimation will be an overestimate. To solve this, imports of monitors LCD and plasma with HS codes of 852851, 852852, and 852859 were obtained and yearly ratio of imports of CRT to total CRT/LCD/plasma imports were obtained. Then to estimate the distribution of CRTs in this aggregate 20-01-35 and 16-02-13 wastes, 8-year-before's import ratio of CRT to all monitors were multiplied with unit recycled waste in that code.

Since 2004, ABS imported from European Countries was assumed to have no c-OctaBDE, so from then on the estimations were done for the countries filed exemption from banning c-OctaBDE and c-PentaBDE use in their production. These countries are Brazil, Cambodia (for c-OctaBDE), Japan, Republic of Korea, and Turkey. Aside from EU Countries, it is unexpected to have ABS containing c-OctaBDE from China or India, either (Sharkey, et al.

2020). Even if comparatively older, Peng et al. (2007) stated the extensive use of c-OctaBDE in Taiwan, so it was also included in the calculations, owing to the considerable volume of ABS import to Turkey from Taiwan. Before 2004, all imported ABS was assumed to contain c-OctaBDE. Figure 3 shows an example of ABS imports of Turkey from other countries for 2019, to illustrate major exporters.

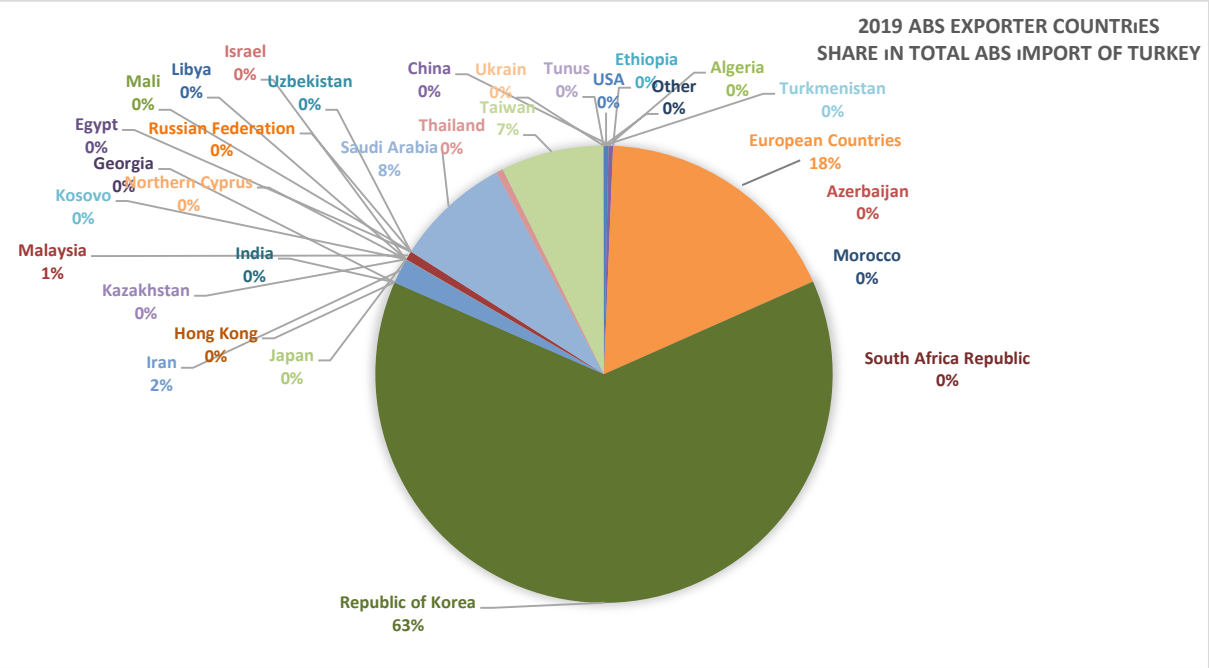

Figure 3: ABS import to Turkey from other countries, and their percentage compared to the total ABS import to Turkey for 2019 (TURKSTAT data).

According to the Draft risk management evaluation of octaBDE (Persistent Organic Pollutants Review Committee, 2008), the c-OctaBDE weight loading on ABS polymers was stated as in between 12 – 18%. Here the same ratio for the estimation of the minimum/maximum range of c-OctaBDE entering Turkey via this route was used. Unfortunately, ratio of c-OctaBDE containing ABS to all ABS is unknown, but literature studies on analysis of certain EEE and their corresponding polymer and flame retardant content were used (Wäger et al., 2010; Wolf, 2001). There are three categories related to the single ABS: TV-housings, Housings of IT-appliances and Monitors & TV sets, in which 60%, 10% and 25% of the appliances have octaBDE, respectively. As a result, 95 over 300 (100 for each category) corresponded to OctaBDE in ABS. Hence, roughly 1/3 of the ABS imported was assumed to have OctaBDE,

albeit the number is probably much lower as there were replacements of OctaBDE in ABS production. Consequently, 1/3 of ABS imports to Turkey from all countries between years 2000 and 2004 were considered to contain c-OctaBDE, while from 2005 on, imports from only 5 countries, i.e. Brazil, Cambodia, Japan, Republic of Korea, and Taiwan, were taken into account (Table AIV/6). The maximum octaBDE entry to Turkey via ABS imports between 2000 and 2020 ranged 41,643.2 – 62,464.8 tons.

The direct import of tetra-, penta-, hexa-, hepta, and octaBDE was estimated based on the HS code of 382488 given in the United Nations Comtrade database (the import/export of the commodity of "Chemical products, mixtures and preparations; containing goods specified in Subheading Note 3 to this Chapter; containing tetra-, penta-, hexa-, hepta- or octabromodiphenyl ethers"). This HS code was investigated from TURKSTAT foreign trade statistics database for import of intermediate goods and specific trade system (Tables AIV/7&8). From these two categories of direct PBDE imports, a net of 181,713 kg of PBDEs were imported in between 2017 and 2019. Their use is still unknown, yet the amount is deemed significant to be reported.

A summary of c-pentaBDE and c-octaBDE inventories in Turkey is demonstrated in Table 3. Obviously, the greatest challenge is the uncertainty in the amount of ABS produced in non-European countries, not only undermining the effort of generating an accurate inventory of the c-OctaBDE amount in a specific country, but also preventing the implementation of actions to reduce it. Nonetheless, c-octaBDE entry via ABS import is still the most crucial part of the entire c-OctaBDE management.

Table 3: Summary of the inventoried c-PentaBDE and c-OctaBDE in Turkey

	c-PentaBDE (kg)		c-OctaBDE (kg)
Motorvehicles in use	92,919	In CRT monitors	92,200
ELV in 2012-2019	9,183	In CRT entering waste	11,370
Recycled from ELV	4,677.6	Recycled from CRT	17,059
Disposed from ELV	4,505.7	Entered via ABS import	41,643,200 – 62,464,800
Total	111,285	Total	41,763,829 – 62,585,429

Inventory of decaBDE

Decabromodiphenyl ether is an aromatic organobromine chemical that have been used since the 1970s as additive flame retardants in a wide range of consumer products. In May 2017, by decision SC-8/10, the Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) amended Annex A to the Convention to list decabromodiphenyl ether (decaBDE; BDE-209) present in commercial decabromodiphenyl ether (c-decaBDE).

The plastics industry is by far the major user of FR and the largest quantities of FR are supplied to raw-material manufacturers. The amount of c-decaBDE used in plastics and textiles globally varies but up to 90% of c-decaBDE ends up in plastic and electronics while the remaining ends up in coated textiles, upholstered furniture, and mattresses. In Turkey, there are researches in literature that found DecaBDE (or BDE-209) in some of their samples with considerable concentrations. Çetin & Odabaşı (2011) analyzed indoor and outdoor window organic films from Izmir, Turkey and found that in the determined samples technical penta-BDE and deca-BDE mixtures were prevailing, and emissions from steel plants in nearby were attributed as the source. In their another study, Çetin & Odabaşı (2007) found that both air-water exchange and dry deposition over İzmir Guzelyali Port in Turkey were decisive on PBDE levels, and BDE-209 was present in the highest concentrations. Uçar et al.

(2011) analyzed butterfat from 18 different parts of Turkey in terms of PCDD/Fs, PCBs, and PBDEs, and albeit not in very high levels, significant BDE-209 presence was observed in some samples. Demirtepe & İmamoğlu (2019) reported worldwide highest BDE-209 concentration in industrial wastewater sludge, which comes from mainly automotive based Organized Industrial District. Beside these, DecaBDE use and their distribution has not been inventoried in Turkey previously.

List of Undesirable Substances (LOUS) survey of EPA (Lassen et al. 2014), stated that in USA, the use of DecaBDE was partitioned into 5 sectors as 26% to automotive & transportation, 26% to building & construction, 26% to textile, 13% to EE and 9% to others, and that in EU EE is expected to be lower share due to the early ban in 2008, and that almost 50% use is allocated to textile in general. In Japan, the situation is a bit different. Sakai et al. (2006) reported that the DecaBDE flow from textile is less than 200 tons/year compared to the 1200 tons/year flow of TVs, and 90% of waste textile is either landfilled or incinerated. From automobile shredding residues and corresponding vehicles airbags, 100 tons/year DecaBDE flow was estimated.

Another important point comes from the study of Strakova et al. (2018), in which 92% of the analyzed toys and consumer products, via recycled plastics, contained DecaBDE between 1 to 3310 mg/kg concentrations. Wäger reported that (2010) average concentration of DecaBDE in small WEE was around 510 ppm, and according to Schlummer (2007) in CRT housing this concentration might go higher than 21,500 ppm.

End-of-life vehicles (ELV) also contain DecaBDE, among other PBDE congeners. In Ireland's 7th COP's National Implementation Plan for Stockholm Convention, DecaBDE was found in concentrations of 100 to 200 mg/kg in the following components of ELV: dashboard, headrest, seats, door panels and bumpers. These non-metallic parts are generally referred as automotive shredder residue (ASR), as well. It comprises 15-25% weight of the ELV (Vermeulen et al. 2011). By assuming a coefficient of 0.625 g decaBDE content per kg of ASR component in recycled ELVs (Morf et al. 2003), 5.8 and 4.4 tons of decaBDE content was estimated for Turkey for 2015 and 2016, respectively, while for the following years waste amount was zero (Table AIV/9). It should be mentioned that the depolluted fraction of

recycled ELV (160106 waste code) in Turkey is nearly two orders of magnitude higher, yet where these depolluted parts are disposed is unclear from the data, and even if they were all carrying 0.625 g/kg ASR DecaBDE, the total number would still be on the order of a few tons.

The next significant decaBDE source is WEEE. WEEE related by-law of Turkey does not yet prohibit the untreated recovery or recycle of the corresponding wastes; and thus, it is relevant to inventory the WEEE components flow by using CRT, plasma and LCD monitor imports and estimated DecaBDE (Table AIV/10). The available 4 year-data indicated that 875.4 tons of DecaBDE is estimated to re-enter to the consumer products via recycling. The waste stream's DecaBDE content from 2015 to 2018 was estimated in TableAIV/11, including small household appliances, IT and telecommunication equipment, and consumer equipment all containing POPs under the banner of 20-01-35* waste code. From this category of WEEE, it is expected that around 27.9 tons of DecaBDE has reentered the consumer products, and relatively negligible amount was disposed between 2015-2018 period. As the same code also corresponds to the CRT, LCD, and plasma monitors. In the calculation, it was assumed that 20-01-35* waste code category in Turkey's case is completely composed of CRT/LCD/plasma TV wastes and all contain DecaBDE, and in addition to the 122 tons coming from ELV recycle and 875.4 tons from CRT/LCD/plasma, total of 997.4 tons of DecaBDE was estimated to enter from waste recycle to the products.

There is a predicted use of DecaBDE in building & construction materials as well. In TURKSTAT's national production statistics, a relevant commodity is named as following: "Fire-proofing, water-proofing and similar protective preparations used in the building industry" with a product code of 20.59.59.67.00. Currently there are 81 recorded companies producing this good in Turkey and total yearly output is given in TableAIV/12. The recorded sales values are comprised of both national and international sales, and thus, it is difficult to understand what percentage of it remained in the country. However, the number of the total produced amount, 1,313,200,543 kg can still be used. Among the building construction sector flame-retarding materials, PE plastic sheeting and PVC plastic sheeting were already considered elsewhere in the statistics data. PUR foam in insulation, fillers, XPS, PE insulating

foam, PP plastic sheeting were not distinctively classified under another code, so it is assumed that especially their consideration for the building & construction sector were included under the 20.59.59.67.00 code. There are different weight percentages for different types ranging from 2% to 22%. However, for this instance it is not safe to assume that all content is DecaBDE used, not for the fact that there are other flame retardants, but also water-proof and other protective preparations were also included in the definitions. Thus, the smallest percentage 2% by weight (Morf et al. 2003) was taken, and it results in 26,264,010 kg DecaBDE, or 26,264 tons of DecaBDE.

The last sector in which significant DecaBDE use can be expected is textile industry, especially the upholstery part. The product data in textile is extremely differentiated and numerous. There are specific categories for velour pile fabrics (a similar commodity of 13.20.41 as woven pile fabrics). According to the draft guide for DecaBDE inventory preparation, approximate DecaBDE addition is 0.35 fraction of the total fabric, and that is same for cotton as well. The DecaBDE content predictions were based on the corresponding m^2/year productions, assuming densities for velour pile fabric as 75 g/m^2 and cotton as 35 g/m^2. Even though not all the fabrics were included, textile is still predicted as the most important DecaBDE containing sector with its products. From 2005 to 2018, 52,203.3 tons of DecaBDE was estimated to be in the market through its products (Table AIV/13).

In conclusion, 997 tons of DecaBDE is estimated to be in the waste stream and then recycled to the products, and 78,467 tons are expected to be in the products directly, which makes 78,467 tons.

Industry survey results

To examine the current use of flame retardants in different sectors in Turkey and check whether they used any of the persistent organic pollutants, surveys were sent to the a few thousands of selected companies with the product codes given in Table AIV/14 in their identification. In addition to these products, four sectors of 13.30 (finishing the textile products), 20.12 (dye materials and pigments), 20.59 (other unclassified chemical products) and 20.60 (artificial or synthetic fiber) were also included in the survey. Throughout the survey, none of the industry reported a flame retardant among Annexes of the Stockholm

Convention. What they reported is illustrated as a cumulative amount in Table AIV/15. From these findings, we can conclude that the industry in Turkey successfully moved to the alternatives of POPs while selecting flame retardants.

2.3.1.4. Hexabromocyclododecane (HBCD)

1,2,5,6,9,10-Hexabromocylcododecane (HBCD) is defined as a novel flame retardant and it has been increasingly used as a substitute for other brominated flame retardants such as polybrominated diphenyl ethers (PBDEs). The world production has increased from 16 000 tons in 2000 to 23 000 tons in 2008, and the most of this increase has occurred in China. Approx. 80% of HBCD produced is estimated to be used as a flame retardant in expanded polystyrene (EPS) and extruded polystyrene (XPS) insulation products for buildings and construction (EU, 2008). Transport of compounded polystyrene (PS) with HBCD (granules, masterbatch or beads) over long distances cannot be excluded, but information on this is totally lacking. EPS is available with or without HBCD and if HBCD is used, it constitutes approx. 0.5% (0.5-0.7% HBCD w/w) of the final product by weight (EUMEPS, 2002). The main application of HBCD is in the production of extruded and expanded polystyrene sheets used for insulation purposes in building & construction sector. Among the other uses, upholstered furniture, automotive internal textiles, automobile cushions and insulator blocks in trucks/vans, packaging materials and EEE. HBCD was listed under Annex A chemicals of the Stockholm Convention with an exemption that it could still be used until November 28th, 2019 as alone or in mixture in the production of EPS.

Considering the use areas of HBCD, there are 4 expanded and 7 extruded polystyrene producers in building and construction sector in Turkey. Globally speaking, Turkey's EPS industry is the largest around Middle East and Central Asia region, and the third in Europe. The EPS industry in Turkey, represented by completely local pre-blended PS producers, in average made an annual consumption of 974,590 kg of HBCD before the national precautions regarding this chemical entered into force. According to the data provided by EPSDER (an industrial association), the total annual HBCD consumption was determined as 1,214,167 kg. Total PS production, import and HBCD consumption data were provided in Tables AIV/16&17. The By-law on Persistent Organic Pollutants, which was published and entered

into force in 2018, has banned the use of HBCD and as of 2020, the domestic use of the chemical has been ended. Approximately 23 tons of HBCD stock in the country was disposed of within the scope of the project carried out in cooperation with UNIDO and UNDP with the support of GEF.

XPS industry is differentiated from EPS by their direct use of HBCD at the final process steps. All production requires the use of flame retardants and this has been done via HBCD based ones up to the present. Additionally, the sector is mostly based on local market. As it is a low-density high-volume commodity, its importation and exportation are comparably low owing to the obstacles in its transportation. Annual HBCD based flame retardant consumption by XPS producers in Turkey was 704.7 tons on average for 2016-2018 (Table AIV/18).

2.3.1.5. Other and newly listed POPs

Information concerning to newly listed POPs is relatively scarce or not available. For hexachlorobutadiene, the information is not available through TURKSTAT's foreign trade information system.

Short chain chlorinated paraffins (SCCP)

Chlorinated paraffins are industrial mixtures with a chlorine content ranging from 30 to 70% (Gao et al., 2012). SCCPs are primarily used in metalworking applications and in polyvinyl chloride (PVC) processing. SCCPs are also used as plasticizers and flame retardants in a variety of applications, including in paints, adhesives and sealants, leather fat liquors, plastics, rubber, textiles and polymeric materials. SCCP mixtures are named according to the chain length, and have varying carbon chain length and degree of chlorination.

The SCCP inventory of Turkey was estimated through TURKSTAT Foreign Trade Information System according to the HS codes, representing the other paints and varnishes (including enamels and lacquers) based on synthetic polymers or chemically modified natural polymers that melt or disperse in a non-aqueous environment, other solvents based on acrylic, other solutions based on vinyl polymer, synthetic paraffin and other plasticizers for rubber and plastics since these are assumed to include SCCP (Table AIV/19). Total amount demonstrates some amount of SCCP residue in the country. However, there are no specific

data on this chemical, since it is newly introduced in the national legislation, hence there is a high possibility of overestimation in the amounts presented here. More detailed inventory study for SCCP is required.

Polychlorinated naphthalenes (PCN)

PCNs were used as transformer and capacitor dielectric fluids, insulating coatings in electrical wires, wood preservatives, rubber and plastic additives and in lubricants. Commercial PCN mixtures contain up to 75 congeners with varying degree of chlorination.

The PCN inventory of Turkey was estimated through TURKSTAT Foreign Trade Information System according to the HS codes for the pure chemical mixture, and their import constitute 14 kg of total PCN for the years 2017, 2018 and 2019 (Table AIV/20).

Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds

PFOA, its salts and PFOA-related compounds are used in the production of fluoroelastomers and fluoropolymers, non–stick kitchen ware, food processing equipment, as surfactants and surface treatment agents in textiles, paper and paints, firefighting foams.

The inventory for PFOA, its salts and PFOA-related compounds was analyzed within the frame of the HS Codes. (Table AIV/21). In the scope of the HS codes generally, other perhalogenated derivatives, finishing preparations of a type used in textile, paper, leather and similar industries, providing fixing or accelerating the dyeing process, lubricating preparations, paint, ink, adhesive and varnish derivatives were examined. As PFOA is newly added to both the Convention and to the Annex of National By-law, the data availability is limited. Sectoral analysis and inventory studies will be carried out in further stages.

2.3.2. Chemicals listed under Annex B of the Conventions

2.3.2.1. DDT

DDT use in Turkey was restricted in 1978, and banned completely in 1985. The last stockpile was disposed as already explained in the previous NIP.

2.3.2.2. Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride

PFOS is an anthropogenic chemical that is produced synthetically from PFOSF and from its salts. If a substance includes one or more PFOS groups ($C_8F_{17}SO_2$), it becomes a PFOS-related substance. They are mainly used in industrial processes and in fire-fighting foams, textiles, paper, leather, wax, polishes, paints, varnishes, metal surfaces, and carpets. There are also some uses in semiconductor industry and hydraulic fluids in aviation sector.

Production and use of perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF) were added to the Annex B of the Stockholm Convention because of its high surface activeness and meeting the POPs criteria. It is eliminated by all Parties except for the use and production for some purposes and specific exemptions are applied in accordance with Part III of Annex B to the Convention. In Turkey, besides the Convention, PFOS is restricted in the Framework of the By-law on Persistent Organic Pollutants. PFOS is not produced in the country as a raw chemical, instead, it is imported. Considering the conjugates, it is assumed that PFOS enters to the country through the chemicals which are considered within the PIC framework. The estimated amounts of import&export of PFOS was analyzed in Table AIV/22. There is a significant decrease in total net amount of import of PFOS between 2017-2019. The HS codes for the articles that may contain PFOS is also determined and the import & export amounts of the articles which potentially contain PFOS is gathered from the TURKSTAT database (Table AIV/23). These articles include hydraulic oils, insecticides, fire extinguishing foam and devices. In general, it was observed that the amount of PFOS has decreased within the scope of pesticides and fire extinguishers which are main source of PFOS. However, a detailed inventory analysis should be done to formulate conclusive actions of controlling products and production processes with articles imported to country.

There are six priority sectors examined for amount of PFOS in the country;

- Metal Plating
- Textile
- Apparel

- Synthetic Carpet
- Paper-Cardboard
- Aviation Hydraulic Fluids

Sectoral reports reviewed for production, import and export amounts for priority sectors are provided in Table AIV/24&25. The amounts were assumed considering previous years' values. Approximately 50% of the total three-year imports in the textile industry came from European countries. Considering EU regulations, it is assumed that half of the imports unlikely have PFOS. The countries where PFOS may come from are estimated as Asia, Middle East and African Countries, which accounts for about thirty percent of all exports.

According to IHKIB reports approximately 70% apparel is exported to EU. Under REACH Regulation, EU pays attention to the PFOS content in the imported apparels. This shows that the apparel industry in Turkey have manufacturing capacity without using PFOS. Considering the priority sectors, it is obvious that the total amount of PFOS remaining in the country has decreased over years.

There are no detected stockpiles of PFOS. However, contaminated sites will be further analyzed.

2.3.3. Chemicals listed under Annex C of the Conventions (Unintentionally produced POPs)

One of the major goals of the Stockholm Convention on POPs is the continuing minimization and, where feasible, ultimate elimination of unintentionally produced POPs. Parties are required to identify, characterize, quantify and prioritize sources of releases of unintentionally produced POPs, and develop strategies with concrete measures, timelines and goals to minimize or eliminate these releases. To this end, Parties must develop action plans as part of their NIP to identify, characterize and address the releases of unintentional POPs listed in Annex C; namely,

- Polychlorinated dibenzopdioxins (PCDDs),
- Polychlorinated dibenzofurans (PCDFs),
- Polychlorinated biphenyls (PCBs),

- Hexachlorobenzene (HCB),
- Pentachlorobenzene (PeCB),
- Hexachlorobutadiene (HCBD) and
- Polychlorinated naphthalenes (PCNs).

Action plans to be developed according to Article 5 of the Convention shall include evaluations of current and projected releases that are derived through the development and maintenance of source inventories and release estimates, taking into consideration the source categories listed in Annex C (UNEP, 2013).

To achieve the goal of the Convention, Parties are required to implement or promote best available techniques (BAT) and best environmental practices (BEP), as described in the "Guidelines on Best Available Techniques and Provisional Guidance on Best Environmental Practices relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants".

2.3.3.1. PCDDs/Fs Inventory

Turkish uPOPs inventory was conducted for year 2019 based on the source groups and the results are summarized in Table AIV/26. Comparison of two inventories indicates that there is an estimated decrease of 35% in total uPOPs amount (1306 to 846 g TEQ/a) from 2014 to 2019.

Changes of the uPOPs with respect to type of the releases, and to source categories are also given in Figures 4 and 5, respectively. The results showed that total uPOPs releases are estimated as 50% in the residues, 20% in the atmospheric emissions, 11% in the wastewater discharges and products and 8% in the land. When compared to previous inventory, while total releases decreased from 63% to 50% and from 24% to 20% for the residues and air, respectively; a significant increase (from 1% to 11%) is recorded for wastewater discharges which is attributed to the change in the amount of hazardous waste disposed in the landfills. The amount of hazardous waste stated in the inventory of 2010 was estimated as 580,847 t/a due to lack of data in that year, however, it seems that this is an underestimation as the

amount is determined as 1,675,047 t/a for the current inventory (TURKSAT, 2018) which leads to such an increase in the release of wastewater discharges. The significant decreases in the air emissions from 309.2 to 166.3 g TEQ/a (about 46%) and in residues from 816.9 to 425.1 g TEQ/a (about 48%) explains the difference between two inventories to a large extent (Figure 4).

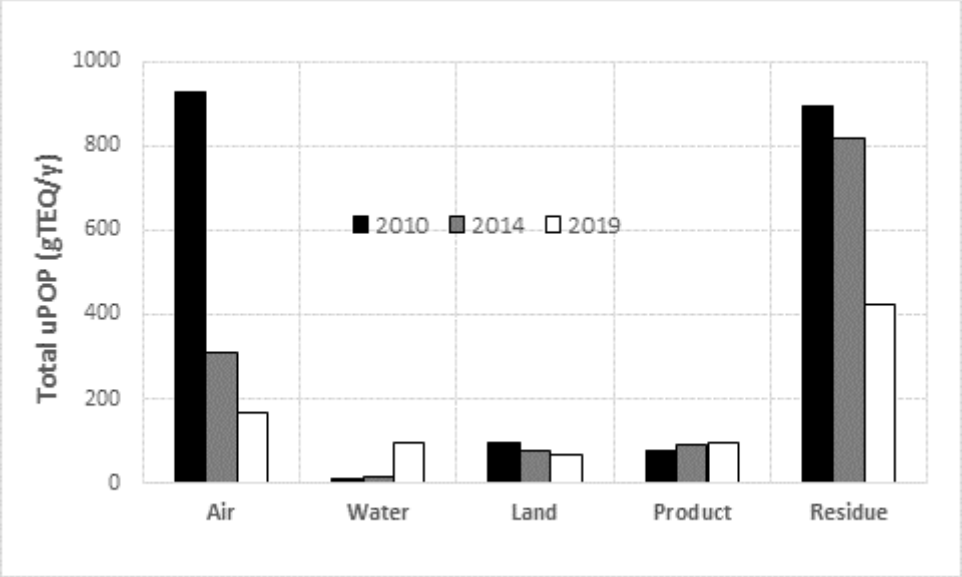

Figure 4: Change of the uPOPs in Turkey from 2010 to 2019 with respect to types of releases

An assessment of the changes in the uPOPs releases for the individual source categories in the inventories of 2014 and 2019 indicates that the significant decrease in total uPOPs releases (from 723.8 to 234.6 g TEQ/a, 58% decrease) comes mainly from ferrous and non-ferrous metal production processes (Figure 5). This result supports the fact that necessary investments were introduced and proper air pollution abatement systems have been installed in the leading companies of the sector. In this sense, POPs Legacy Elimination and POPs Release Reduction Project had a great contribution to the PCDD/F reductions especially at the iron and steel production companies. During preparation phase of this project, the sector representatives were informed on the possible effects of the PCDD/F emissions and; acceptable and effective reduction technologies/techniques were recommended. In the light of all these rising awareness activities, the leading companies became stakeholder in the project and started their investment activities. During the implementation phase, BAT/BEP studies were performed,

site specific reports were developed for each company and investments were supported which clearly made contribution to the reduction. For instance, 150 mg TEQ/yr of PCDD/F reduction was recorded in one company with upgrade of electrostatic precipitators. In another company, modification of raw material to decrease the Cl content resulted in reductions of 6.09 g TEQ/yr. In addition, successful implementation of By-law on the Control of Industrial Air Pollution and effective auditing has led to significant reduction in PCDD/F emissions.

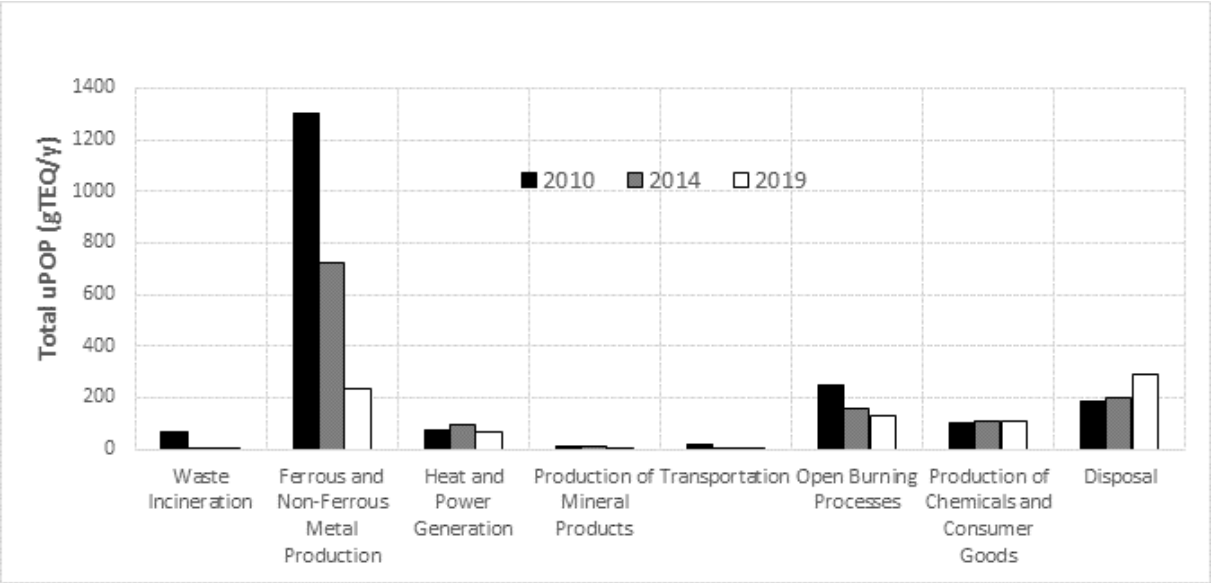

Figure 5: Change of the uPOPs releases in Turkey from 2010 to 2019 with respect to source categories

In addition to ferrous and nonferrous metal production, reduction was also observed in the production of mineral products proving that good dust abatement efforts made in the main sectors although increases in the production of these materials were recorded. On the other hand, 31% of increase (from 200.9 to 290.2 g TEQ/a) in the releases originated from disposal category is mainly due to the increase in the amount of hazardous waste disposed in the landfills as explained above.

2.3.3.2. Unintentionally produced PCBs

As a requirement of the By-law on the Control of Industrial Air Pollution, the representatives of industrial plants are responsible for reporting PCB levels in their emissions and to keep the values below 0.1 ng/Nm^3 in order to have license to continue on their productions. Therefore, available data supports the fact that the unintentionally produced PCBs levels are low in the atmosphere.

In addition, the available data has been gathered from the literature studies since 2015 on emission sources in different environmental compartments. For example, Urganlı et al. (2016) determined ambient air PCB concentrations through active air sampling in Izmir, the third largest metropolis in Turkey and the annual mean concentration of 32 polychlorinated biphenyls (Σ_{32}PCBs) was measured as 348 ± 334 pg/m^3. The results also revealed that the estimated population risk associated with dermal contact and inhalation routes to Σ_{32}PCBs did not exceed the acceptable level of 1×10^{-6}. The study of Sarı et al. (2020), on the other hand, reported the concentrations of a total of 40 PCBs congeners in the outdoor air of three houses during summer and autumn in 2017 in Bursa, a city having eighteen of organized industrial zones. The average Σ_{40}PCBs outdoor concentrations determined as 303 ± 183 pg/m^3 and 41 ± 23 pg/m^3 for summer and autumn, respectively and the potential source was defined as landfill located nearby. In the studies conducted in other areas of Turkey, the determined concentration of PCBs in outdoor sites were reported between 349 and 94,363 pg/m^3 in Izmir (Aydin et al., 2014) and 4152 pg/m^3 in Kocaeli (Cetin et al., 2017) where the sampling points were close to industrial sites. PCB levels were also monitored in water and sediment samples collected from 12 stations located in Ankara River for 12 months and the results showed presence of PCB101 residues in sediment, as no PCB was detected in water samples (Sevin et al. 2018).

2.3.3.3. Other unintentionally produced POPs

There is no available official emission inventory of hexachlorobenzene, pentachlorobenzene, hexachlorobutadiene and polychlorinated naphthalenes in Turkey. On the other hand, PAH levels have been measured in the industrial plants as a requirement of the By-law on the

Control of Industrial Air Pollution, the values have been reported below 5 mg/Nm^3, 1 mg/Nm^3 and 0.1 mg/Nm^3 for the flow rates of 25 g/hr, 5 g/hr and 0.5 g/hr, respectively, as stated in the By-law. Therefore, available data supports the fact that the unintentionally produced PAHs levels are lower than limits and are under control.

Several literature studies provide data on unintentional production of PCNs in Turkey. For example, soil samples from Hatay-İskenderun where iron-steel processing industry dominate showed average $\sum_{32}$PCNs concentration of 0.28±0.28 µg/kg dry weight (Odabaşı et al., 2010). Another study from the same region revealed $\sum_{32}$PCNs concentrations of 0.36±0.40 µg/kg dry weight in soil, 1.5±0.86 µg/kg dry weight in 2-year needle from pine trees, and 113±56 pg/m^3 in air samples (Odabaşı et al., 2016), while the same type of samples from industrial sites in Aliağa-İzmir had $\sum_{32}$PCNs concentrations of 1.11±1.14 µg/kg, 1.88±1.85 µg/kg, and 107±69 pg/m^3 respectively (Odabaşı et al., 2015). The industries involved in Aliağa region are iron-steel plants, petrochemical plant, ship-breaking and power plants. Direct stack-gas measurements from steel plants in Aliağa-İzmir demonstrated $\sum_{32}$PCNs concentrations between 30 and 402 ng/Nm^3 without including the plant with scrap preheating, indicating iron-steel plants to be the major sources for PCNs (Odabaşı et al., 2017). On the other hand, atmospheric concentrations of $\sum_{32}$PCNs from suburban and urban sites in İzmir ranged between 3.7 to 229 pg/m^3 (Odabaşı et al., 2012). Lastly, soil PCN concentrations from Kocaeli, another region with heavy industrial activities, ranged between 0.04 to 7.07 µg/kg dry weight (Çetin, 2016). All these studies suggest significant unintentional production of PCNs in Turkey and emphasizes the need for further investigation.

2.3.4. Stockpiles, Wastes and Contaminated Sites

In order for Turkey to take necessary measures on POPs, the location of contaminated sites, the condition of POPs stockpiles and the amount of POPs used must be systematically determined, with the help of accurate POPs inventory and established administrative and technical infrastructure. In this context, The By-law on Control of Soil Pollution and Sites Contaminated by Point Sources is implemented for determination of contaminated or possibly contaminated sites and recording these sites on Contaminated Sites Information System. However, this system should be updated to cover POPs contaminated sites.

Most of the old POPs stockpiles have been identified and approximately 3000 tons of HCH (lindane) stockpile in Kocaeli have been eliminated in 2022 in the scope of GEF project conducted in collaboration with UNIDO/UNDP.

As long as pesticides were banned and restricted in Turkey, necessary measures were taken and use of pesticides like aldrin, dieldrin, heptachlor, DDT, chlordane, toxaphene have been restricted since 1980s. Some exceptional uses of aldrin, heptachlor and DDT were once permitted; however when HCH residues on plants and DDT on straws were found, a warning has been issued to take necessary measures in 1985.

During implementation of the POPs Legacy Elimination and POPs Release Reduction Project (No.140288) funded by GEF and cooperated by MoEUCC, UNDP and UNIDO, 300 tonnes of PCB containing materials and equipment was eliminated, and 6094 transformers were analysed for PCBs. According to the results of this analysis, 42,6 tonnes of transformer oil having a PCB concentration greater than 50 ppm were decontaminated. The Ministry of Environment, Urbanization and Climate Change limited the amount of PCB in the waste oil, prevention of flaming oils and disposal of the oil in an environmentally sound manner. Academic research studies conducted in Turkey reveal PCB concentrations in environmental and food samples as well as concentrations of other POPs, which might indicate possibly contaminated sites. However, they should be evaluated further considering the risk associated with these concentrations. The detail of the studies is provided in section 2.3.5.

MoEUCC also set the methods and the principles of disposal of the waste electric and electronic equipment containing POPs and bans the use of several POPs in electric and electronic articles. The related POPs chemicals are PBB, PCB and PBDE. Moreover, MoEUCC is regulating the landfilling of hazardous wastes containing POPs. However, further assessment is needed on uncontrolled dumpsites, sites that may be contaminated with PBDEs and PFOS containing products and petroleum refinery sites. From uPOPs perspective, historical and current activities of related industries should be identified and potentially contaminated sites should be assessed by taking into account the degree of contamination and the associated risk. In this context, related industries are chlor alkali production plants, paper

production, timber production, waste incineration plants, iron and steel production and processing plants.

Additionally, there is an ongoing project implemented by United Nations Development Program (UNDP) for capacity building and technical assistance for contaminated site remediation in Turkey.

2.3.5. Current Programs and Results on Monitoring of POPs Emissions and Effects on Human Health and Environment

There is no systematic monitoring program on POPs emissions, releases and occurrence in the abiotic or biotic matrices in Turkey. However, some of the POPs are being monitored for auditing compliance with legislations such as pesticides with By-Law on Surface Water Quality management and By-law on Control of Pollution Caused by Dangerous Substances in Aquatic Environment, and uPOPs with By-law on Control of Air Pollution Arising from Industrial Facilities. Previous monitoring and academic research studies have been presented in the previous NIP in 2016. Hence, updated results on literature search for the POPs levels identified in abiotic and biotic matrices are summarized in Annex V.

2.3.6. Current level of information, awareness and education among target groups; existing systems to communicate such information to the various groups; mechanisms for information exchange with other Parties to the Convention

Turkey, as a party to the Convention, is implementing actions for the involvement of stakeholders and the general public. The main instruments for information access are the POPs website (https://kalicikirleticiler.com/), where all information regarding POPs, Stockholm Convention and projects conducted are presented, informative videos played on mass media. Also, websites of public enterprises, non-governmental organizations and international foundations are providing a means by which people can access environmental information.

According to the Environmental Law (No.2872), everyone, especially the administration, professional associations, unions and non-governmental organizations, is responsible for the protection of the environment and prevention of pollution, and are obliged to comply with the

measures to be taken and the principles determined. Hence, every region and every group should realize the function of the environment and potential problems that may occur. This emphasizes the need for environmental training at every level. Environmental training is included in the curriculum of primary schools in Turkey. There are studies on training of decision makers, training of all related source executives, raising awareness of public and raising the motivation for supporting the environmental activities.

2.3.7. Activities of Non-Governmental Stakeholders related to POPs

Non-governmental organizations have a great role in raising awareness of public and supporting actions and measures to be taken by the governmental organizations about POPs management in Turkey. Specifically, the NGOs, such as the Chamber of Industry and Trade, provides a major contribution to effective information sharing with its members on activities related to POPs. Other NGOs for providing inventory information, helping candidate foundations to apply are IMMIB, TCUD, TCMB and TTD. Additionally, mass media in Turkey is very interested in environmental problems which create a great advantage on raising awareness of public about POPs.

2.3.8. Overview of technical infrastructure for POPs assessment

Turkey has adapted many EU legislations during the EU Harmonization process and conducted projects in this respect. The projects contributed to build infrastructural and institutional capacity to meet Turkey's liabilities and responsibilities to the Stockholm Convention on POPs. Turkey has conducted projects in regards to components within the scope of EU harmonization and technical assistance.

2.3.9. Identification of Impacted Populations or Environments, Estimated Scale and Magnitude of Threats to Public Health and Environmental Quality and Social Implications for Workers and Local Communities

Declaration and Reporting of Priority Pollutant Releases

DDT was the most commonly used POPs chemical in Turkey, followed by a group of widely used pesticides, i.e. aldrin+dieldrin+endrin, and HCH. By examining the inventories of

industrial chemicals, PCBs, PBDEs and PFOS can be considered as priority pollutants that need further assessment regarding the materials and wastes containing these chemicals and sites contaminated with these chemicals.

Current Monitoring Standards and Capacity for POPs

There is no systematic monitoring program on POPs emissions, releases and occurrence in the abiotic or biotic matrices in Turkey. However, some of the POPs can be monitored for auditing compliance with legislations by Ministry of Health, Ministry of Environment, Urbanization and Climate Change and Ministry of Agriculture and Forestry Affairs.

Current Occupational Safety Measures of POPs Pesticides and Industrial Chemicals

The POPs chemicals have been banned in Turkey and since they are not in use for some time, occupational safety measures for management of these chemicals and wastes containing these chemicals should be taken. In this context, not only ILO's guidelines but also Regulation on Health and Safety Measures in Occupations with Chemical Substances (12th August 2013, No: 28733) are taken into consideration. Employers has liabilities and responsibilities to determine the presence of a chemical of concern, to conduct risk assessment, prevent employee's exposure to the chemicals and take precautions to minimize the risk of the hazards caused by the chemicals when exposures cannot be avoided.

2.3.10. Relevant systems for the assessment and listing of new chemicals

Pesticides and industrial chemicals have different registration procedures in Turkey. The details of registration procedures were presented in the previous NIP. Accordingly, the assessment and listing of new chemicals are the concerns of By-law on Registration, Evaluation, Authorization and Restriction of Chemicals (by MoEUCC, June 23rd, 2017 numbered 30105), By-law on Licensing and Placing on the Market of Plant Protection Products (by MoAFA November 9th, 2017 numbered 30235), By-law on Wholesale, Retail Selling and Storage of Plant Protection Products (by MoAFA February 13th, 2019 numbered 30685), and By-law on Biocidal Products (by MoH December 31st, 2009 numbered 27449).

2.3.11. Relevant systems for the assessment and regulation of chemicals already in the market

The details of assessment procedures were presented in the previous NIP. Accordingly, the assessment and regulation of chemicals are the concerns of By-law on Controlling the Plant Protection Products (by MoAFA July 6th, 2011 numbered 27939), By-law on the Import of Plant Protection Products and Their Raw Materials (by MoAFA December 14th, 2018 numbered 30625) and By-law on Biocidal Products (by MoH December 31st, 2009 numbered 27449).

3. Strategy and Action Plan Elements of the POPs NIP

3.1. Introduction

The main strategy objectives of the NIP are as follows:

- Effective implementation of legislations related to the management of POPs and publishing or revising the legislations regarding the prohibition of the production, use, import and export of new POPs
- Continuous update of inventory of old and new POPs as a tool for decision making process
- Elimination of POP releases into the environment especially reduction of uPOPs releases
- Elimination of legacy POPs stockpiles
- Promotion and application of BAT/BEP principles as key principles of the future industrial development strategy and for elimination of POPs stockpiles and remediation of contaminated sites
- Updating inventory of contaminated sites with special attention to POPs
- Preparation and implementation of national monitoring programs.

By-law on Persistent Organic Pollutants has entered into force and other relevant legislations are planned to be published in a couple of years. National POPs inventory studies have been conducted regarding intentionally and unintentionally produced POPs, and the results of inventory studies revealed the important sectors regarding BFR usage and uPOPs emissions.

Successful implementation of legislations and auditing resulted in a decrease in uPOPs emissions.

3.2. POPs National Priority Areas

The national priority areas for management of POPs are as follows:

- Legislative applications including regulation and enforcement, involvement of the management of POPs policies in the development strategies of Turkey
- Inventory of emissions, releases, stockpiles and contaminated sites for POPs
- Identification of relevant sectors for past use of POPs and past and current production of uPOPs
- Reduction of releases of intentionally and unintentionally produced POPs
- Effective auditing, capacity building and promotion of BAT/BEP implementation in industry and for remediation of contaminated sites
- Public education and awareness raising
- Nation-wide long term monitoring and control of public health and environment
- Information exchange and networking, inter-ministerial coordination and
- Research and development for identification of POPs in environmental matrices, technical materials, products, wastes, and human matrices, remediation of contaminated sites, investigation of human exposure to POPs and identification of safer alternatives

3.3. Activities, Strategies and Action Plans

Implementation of the obligations under the Stockholm Convention and CLRTAP/POPs Protocol in Turkey is assessed in this subsection by discussing the implementation performed so far and new action plans related to the corresponding obligation. Some of the actions included in the previous NIP were also listed here since they are still ongoing. Specific targets, milestones and performance indicators are outlined to allow progress of implementation to be reviewed and monitored.

3.3.1. Institutional Capacity and Regulatory Strengthening Measures

As a candidate country to European Union, Turkey is following, harmonizing, adopting and implementing the relevant EU legislations on controlling the POPs chemicals in domestic use. The EU Regulation concerning Persistent Organic Pollutants, the EU Regulation concerning the placing of plant protection products on the market and the EU Regulation concerning the making available on the market and use of biocidal products were the main sources to follow. By-law on Persistent Organic Pollutants was prepared by harmonizing Stockholm Convention, CRLTAP/POPs Protocol and EU POPs regulation, and entered into force on November 14th, 2018 (No. 30595). Additionally, revisions have been made in other legislations regarding POPs in accordance with the action plans and measures proposed in the NIP prepared in 2016.

In this context, for purposes of manufacturing, use, placing on the market and import, 12 POPs chemicals in industrial category and 18 POPs chemicals in pesticide category have been banned and restricted. For the unintentional production of PCBs, PCDD and PCDF, emission limits have been determined, while no action has been taken for unintentional production of HCB, hexachlorobutadiene, pentachlorobenzene and PCNs. This activity includes measures for development and implementation of more effective legal and regulatory framework for the management of old and new POPs.

Activity 1: Institutional capacity and regulatory strengthening measures			
AP number	Action Plan	Time	Control
AP1.1	To publish draft By-law on Export and Import of Some Hazardous Chemicals to implement and enforce the provisions of Rotterdam Convention and set the principles of Prior Informed Procedure in international trade of chemicals including POPs so that the export of Annex A and Annex B chemicals will be controlled and regulated	2022	XII/2022
Responsibility	MoEUCC		

AP1.2	To include the policies regarding management of POPs in the development strategies of Turkey and to take into account the actions listed in NIP while determining the development strategies	2023	XII/2023
Responsibility	Presidency of Strategy and Budget in cooperation with MoEUCC		
AP1.3	To publish a draft by-law regarding pollutant release and transfer register (PRTR) system for estimation of inventory of POPs	2023	XII/2023
Responsibility	MoEUCC		
AP1.4	To implement the Turkish subordinate legislation technical aspects connected with the new and candidate POPs. In this context, • To prohibit the export of POPs as pure chemicals or products • To control export of POPs pesticides	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoAFA		
AP1.5	To prohibit production, use, placing on the market and import of deca-BDE, hexa-BDE, hepta-BDE, tetra-BDE, penta-BDE, PFOS and short-chain chlorinated paraffins by legal instruments	2022	XII/2022
Responsibility	MoEUCC		
AP1.6	To update By-law on Licensing and Placing on the Market of Plant Protection Products to cover the physicochemical properties, bioaccumulation potential and ecotoxicological data for certification process of new pesticides	2022	XII/2022

Responsibility	MoAFA in cooperation with MoEUCC		
AP1.7	To update By-law on Control of Air Pollution Arising from Industrial Facilities to include emission limits for other uPOPs, i.e. hexachlorobenzene, pentachlorobenzene, hexachlorobutadiene, polychlorinated naphthalenes	2023	XII/2023
Responsibility	MoEUCC		
AP1.8	To update the By-law on POPs to include the monitoring procedures for all listed POPs	2022	XII/2022
Responsibility	MoEUCC		
AP1.9	To implement and update relevant Turkish subordinate legislations regarding the regulation limits connected with POPs in water, soil, sewage, and waste	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoAFA		
AP1.10	To support regular control of the implementation of the NIP measures and continuous upgrade of national POPs inventory	2023	XII/2022, XII/2023
Responsibility	MoEUCC		
AP1.11	To support the establishment and effective working of institutional framework covering individual departments of MoEUCC and other responsible ministries and institutions for successful implementation of the Stockholm Convention, CRLTAP/POPs Protocol and national subordinate legislation including the NIP measures	2023	XII/2023

Responsibility	MoEUCC		

3.3.2. Management of Annex A Pesticides

All POP pesticides have been banned in Turkey, and production, manufacturing, marketing (including import) and use of unregistered plant protection products within the territory of the country are prohibited. The activities regarding the management of Annex A POP Pesticides focus on old storage and illegal storage of pesticides.

Activity 2: Action Plans of Annex A POP-Pesticides			
AP number	Action Plan	Time	Control
AP2.1	To update the inventory of old agrochemical stores, storages, and contaminated sites	2023	XII/2023
Responsibility	MoAFA in cooperation with MoEUCC		
AP2.2	To control existing storage sites and dumping sites, conduct and improve inspections and maintenance to prevent accidents or leakage	2023	XII/2022, XII/2023
Responsibility	MoAFA in cooperation with MoEUCC		
AP2.3	To demolish, clean and empty POPs pesticides storage buildings using BAT/BEP procedures, and develop safe temporary storage if needed	2023	XII/2022, XII/2023
Responsibility	MoAFA in cooperation with MoEUCC		

3.3.3. Management of PCBs and PCB Containing Equipment

Actions and measures regarding the management of PCBs and PCB containing equipment given in 2016 NIP have been implemented by the legislations issued and entered into force. By the implementation of projects, elimination of PCB containing materials, and

decontamination of transformer oils having a PCB concentration greater than 50 ppm are ongoing.

Activity 3: Management of PCBs and PCB Containing Equipment			
AP number	Action Plan	Time	Control
AP3.1	To continuously update PCBs inventory of closed, semi closed and open PCB sources, especially identify products and materials containing PCBs in open applications	2022	XII/2022
Responsibility	MoEUCC in cooperation with industrial associations		
AP3.2	To cease the usage of PCBs and PCB containing equipment as soon as possible	2023	Annually XII
Responsibility	MoEUCC in cooperation with industrial associations		
AP3.3	To update the inventory of PCB contaminated sites and lands, PCB stock sites	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with the universities, research institutions and industrial associations		
AP3.4	To regularly control stockrooms of PCB containing wastes and equipments, and to ensure that they are secured by the facility owners	2022	XII/2022
Responsibility	MoEUCC		
AP3.5	To promote environmentally sound management and application of BAT/BEP for the purification and disposal of transformers and capacitors, disposal of	2023	XII/2023

	PCBs and PCB containing wastes in related industries including ship recycling industry		
Responsibility	MoEUCC in cooperation with MoIT, MoT, and industrial associations		

3.3.4. Management of BFRs

The inventory studies have been conducted for brominated flame retardants (BFRs) by estimating their use in related industries, collecting data on import and export of products, and estimating amounts of produced wastes. Inventory studies showed that more effort was put into the recovery and recycle of end-of-life vehicles than before. Surveys conducted with the industry in Turkey demonstrated that the industry successfully moved to the alternatives of POPs while selecting flame retardants. Inventory estimates also included decaBDE and HBCD which were added to the Annex A of the Convention. Estimates of deca-BDE use in textile sector highlighted the importance of inventory studies in this sector in Turkey. Additionally, Turkey's EPS industry is the largest among Middle East and Central Asia region, and the third in Europe, which may correspond to large amounts of HBCD use and production of wastes. Main actions include identification of direct uses of PBDEs and HBCD, the locations of storage and waste disposal locations, and regularly updating BFR inventories.

Activity 4: Production, import and export, use, stockpiles and wastes of brominated flame retardants			
AP number	Action Plan	Time	Control
Responsibility	MoEUCC, MoIT, MoT and industrial associations		
AP4.1	To identify the landfills and dumpsites potentially contaminated with PBDEs by investigating all the sectors involved,	2023	XII/2023

	manufacturing locations and locations of storage, wastes being disposed, bio-solids application, methods of waste disposal or treatment, and waste disposal locations		
Responsibility	MoEUCC in cooperation with MoAFA and industrial associations		
AP4.2	To update WEEE related regulation for prohibition of the untreated recovery or recycle of the corresponding wastes and implementation of effective screening tools	2023	XII/2023
Responsibility	MoEUCC		
AP4.3	To improve the inventory estimates for deca-BDE especially for textile sector, which is one of the leading sectors in Turkish economy	2022	XII/2022
Responsibility	MoEUCC, MoIT and industrial associations		
AP4.4	To promote usage of alternative flame retardants in related industries	2023	XII/2023
Responsibility	MoEUCC, MoIT and industrial associations		
AP4.5	To improve and regularly update the inventory of BFRs and BFR containing products, including major and minor applications, and the assessment of waste flows, presence in end of life goods	2022	XII/2022
Responsibility	MoEUCC, MoIT, MoT and industrial associations		
AP4.6	To assess the recycling activities and destruction technologies for BFR wastes and implementation of BAT/BEP guidelines in the related activities	2022	XII/2022

Responsibility	MoEUCC, MoIT and industrial associations		

3.3.5. Management of DDT

DDT is not produced, imported, exported and used in Turkey.

Activity 5: Management of DDT			
AP number	Action Plan	Time	Control
AP5.1	Ensure the environmentally sound disposal of illegally imported DDT	In case of detection	
Responsibility	MoAFA in co-operation with MoEUCC		

3.3.6. Management of PFOS

The main activities regarding management of PFOS include data collection on PFOS wastes, stockpiles and PFOS contaminated sites, improvement of inventory on PFOS and related chemicals, and application of BAT/BEP in the relevant industries.

Activity 6: Production, import and export, use, stockpiles and wastes of PFOS, its salts and PFOSF (Annex B, Part III chemicals)			
AP number	Action Plan	Time	Control
AP6.1	To develop and update inventory of PFOS used in related sectors currently and in the past and to assess the disposal of PFOS wastes	2022	XII/2022
Responsibility	MoEUCC in cooperation with MoIT, MoT and industrial associations		
AP6.2	To assess uncontrolled dump sites, sites that may be contaminated with PFOS containing products and petroleum refinery sites	2023	XII/2023

Responsibility	MoEUCC in cooperation with MoIT, MoT and industrial associations		
AP6.3	To assess recycling activities and currently used technologies of PFOS and related chemicals and implementation of BAT/BEP Guidelines	2022	XII/2022
Responsibility	MoEUCC in cooperation with MoIT and industrial associations		
AP6.4	To assess destruction technologies of PFOS and related chemicals and implementation of BAT/BEP Guidelines	2022	XII/2022
Responsibility	MoEUCC in cooperation with MoIT and industrial associations		

3.3.7. Management of polychlorinated naphthalenes, hexachlorobutadiene, pentachlorophenol and its salts and esters, and short-chain chlorinated paraffins

The main activities regarding management of polychlorinated naphthalenes, hexachlorobutadiene, short-chain chlorinated paraffins and pentachlorophenol and its salts and esters include improvement of inventory on polychlorinated naphthalenes, hexachlorobutadiene, short-chain chlorinated paraffins and pentachlorophenol and its salts and esters and periodical update, data collection on wastes, stockpiles and contaminated sites, and application of BAT/BEP in the relevant industries. Hexachlorobutadiene has no records for import and export within the country, while polychlorinated naphthalenes and pentachlorophenol have been imported and exported even if the amounts remained low. On the other hand, there are records on the import and export of materials containing short-chain chlorinated paraffins, although the information gathered needs further examination.

Activity 7: Production, import and export, use, stockpiles and wastes of polychlorinated naphthalenes, hexachlorobutadiene, short-chain chlorinated paraffins and pentachlorophenol and its salts and esters			
AP number	Action Plan	Time	Control
AP7.1	To perform, develop and update inventory of polychlorinated naphthalenes, hexachlorobutadiene, short-chain chlorinated paraffins and pentachlorophenol and its salts and esters used in related sectors currently and in the past and to assess the disposal of their wastes	2023	XII/2023
Responsibility	MoEUCC in cooperation with MoIT, MoT and industrial associations		
AP7.2	To prepare protocols between Customs Office and MoEUCC to obtain the records of the export and import of these chemicals and articles with them in more comprehensive manner	2023	XII/2023
Responsibility	MoEUCC in cooperation with MoT		
AP7.3	To assess uncontrolled dump sites, sites that may be contaminated with polychlorinated naphthalenes, hexachlorobutadiene, short-chain chlorinated paraffins and pentachlorophenol and its salts and esters	2023	XII/2023
Responsibility	MoEUCC in cooperation with MoIT, MoT and industrial associations		
AP7.4	To assess destruction technologies of wastes containing these chemicals implementation of BAT/BEP Guidelines	2022	XII/2022
Responsibility	MoEUCC in cooperation with MoIT and		

	industrial associations		

3.3.8. Reduction of releases form the unintentional production of POPs

Total uPOPs releases in Turkey was estimated to decrease by 35% from 2014 to 2019, mainly due to the investments introduced and proper air pollution abatement systems installed in ferrous and non-ferrous metal production industries. More accurate emission estimates have been carried out especially for wastewater discharges. Successful implementation of By-law on the Control of Industrial Air Pollution and effective auditing has led to significant reduction in PCDD/F emissions. Activities to reduce releases of unintentional production of POPs consist of preparation and regular update of national emission inventory and promotion of BAT/BEP implementation.

Activity 8: Reduction, elimination and control of uPOPs			
AP number	Action Plan	Time	Control
AP8.1	To prepare official emission inventory and identify potential sources of uPOPs: hexachlorobenzene, pentachlorobenzene, hexachlorobutadiene and polychlorinated naphthalenes, and regular update of emission inventories for all uPOPs	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoIT and industrial associations		
AP8.2	To integrate PRTR system for national inventory of uPOPs emissions	2023	XII/2023
Responsibility	MoEUCC in cooperation with MoIT and industrial associations		
AP8.3	To develop strategies for control of uPOPs emissions and revise the related regulations accordingly to include emission limits for	2023	XII/2023

	Polychlorinated naphthalenes, Hexachlorobutadiene, Pentachlorobenzene, Hexachlorobenzene		
Responsibility	MoEUCC		
AP8.4	To routinely monitor emission of uPOPs and PAHs from industrial plants as a requirement of the By-law on the Control of Industrial Air Pollution to check if the emissions are lower than the limits defined in the by-law	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoIT and industrial associations		
AP8.5	To control potential emission sources of uPOPs, especially illegal use of waste and base-oil mixtures, ship breaking and recycling facilities, open burning of agricultural wastes, fires of dumps, iron-steel production and processing facilities and production/import of uPOPs containing materials	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoIT, MoAFA		
AP8.6	To promote implementation of BAT/BEPs for the control of uPOPs emissions	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoIT and industrial associations		

3.3.9. Identification of stockpiles, articles in use and wastes plan for assessment and management of releases from stockpiles and wastes

Activities include identification of POPs containing stockpiles, risk assessment and application of BAT/BEP procedures to eliminate the problem associated with historical pollution caused by legacy POPs stockpiles.

Activity 9: Identification of stockpiles, articles in use and wastes plan for assessment and management of releases from stockpiles and wastes			
AP number	Action Plan	Time	Control
Responsibility	MoEUCC		
AP9.1	To update POPs-containing stockpiles and wastes inventory	2023	XII/2022, XII/2023
Responsibility	MoEUCC		
AP9.2	Prioritisation and risk assessment of sources identified in inventory phase	2023	XII/2022, XII/2023
Responsibility	MoEUCC		
AP9.3	To evaluate the appropriate BAT/BEP procedures and strategies for elimination of current stockpiles and wastes, ensure the guidelines for collection, transport and storage of these stockpiles and wastes are followed	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoIT		
AP9.4	To ensure the licensing, operation, tracking and control of storage facilities including handling and transport procedures in priority sectors (i.e. waste incineration, ship recycling, etc.)	2023	XII/2022, XII/2023
Responsibility	MoEUCC		

3.3.10. Identification of contaminated sites (Annex A, B and C chemicals) and remediation in an environmentally sound manner

Studies for contaminated sites problem have been recently initiated in Turkey. Documents have been prepared for assessing available remediation technologies for sites contaminated with various pollutants. Additionally, there is an ongoing project implemented by United Nations Development Program (UNDP) for capacity building and technical assistance for contaminated site remediation in Turkey. The end recipient of the project is MoEUCC. As a result of this project, it is aimed to 1) technical and institutional capacity for management of POPs contaminated sites will be strengthened, 2) contaminated sites with POPs will be identified and classified, and 3) institutional experience for remediation of POPs contaminated sites will be increased. Other activities include application of appropriate remediation strategies and preparation of financial plan.

Activity 10: Identification of contaminated sites (Annex A, B and C Chemicals and Annexes I, II and III) and remediation in an environmentally sound manner			
AP number	Action Plan	Time	Control
AP10.1	To update Contaminated Site Information System to cover POPs chemicals	2023	XII/2023
Responsibility	MoEUCC		
AP10.2	To develop national database of contaminated sites with special attention to newly listed and candidate POPs	2023	XII/2023
Responsibility	MoEUCC in cooperation with MoIT and MoAFA		
AP10.3	To prioritise and assess the risk associated with contaminated sites identified	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoAFA and MoH		
AP10.4	To evaluate appropriate BAT/BEP	2023	XII/2022,

	procedures, strategies and guidelines for remediation of contaminated sites		XII/2023
Responsibility	MoEUCC		
AP10.5	To prepare a financial plan for remediation of priority contaminated sites	2023	XII/2023
Responsibility	MoEUCC		

3.3.11. Facilitating or undertaking information exchange and stakeholder involvement

This activity contains information exchange and stakeholder involvement actions.

Activity 11: Facilitating or undertaking information exchange and stakeholder involvement			
AP number	Action Plan	Time	Control
AP11.1	To update the information exchange system for international conventions related to chemicals management in cooperation with related institutions (reports, news, websites)	2022	XII/2022
Responsibility	MoEUCC in cooperation with MoIT, MoAFA, MoT		
AP11.2	To ensure continuous information exchange with related institutions concerning POPs	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoIT, MoAFA, MoT, and universities		
AP11.3	To ensure information gathering from the Secretariats of the international conventions and regional centers of the SC	2023	XII/2022, XII/2023

Responsibility	MoEUCC		

3.3.12. Public awareness, information and education

This activity includes developing and continuing public awareness program on POPs focusing on the POPs problems. A website for POPs has been produced to give information on the POPs and projects implemented on this issue.

Action 12: Public awareness, information and education			
AP number	Action Plan	Time	Control
AP12.1	To ensure education programs and trainings for relevant institutions (ministries, custom service, administrative, scientists, teachers, etc.) on the national, regional and local scales	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoAFA, MoH, MoNE, MoT		
AP12.2	To carry out studies and /or projects with the Ministry of National Education (MoNE) regarding the effects of POPs chemicals on human health and environment and POPs, POPs waste and u-POPs management, especially in primary and secondary schools	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoNE		
AP12.3	To ensure the preparation of brochures, posters, bulletins, tv clips, educational video programs concerning to the POPs problems (sources, disposal, human and environmental impacts)	2023	XII/2022, XII/2023
Responsibility	MoEUCC		
AP12.4	Awareness raising of policy and decision	2023	XII/2022,

	maker authorities on POPs		XII/2023
Responsibility	MoEUCC		

3.3.13. Assessment of Effectiveness

This activity includes effectiveness evaluation of the actions in the NIP.

Action 13: Assessment on effectiveness			
AP number	Action Plan	Time	Control
AP13.1	To annually check compliance and evaluate the effectiveness of the implementation of the convention in Turkey	Annually	XII/y
Responsibility	MoEUCC		

3.3.14. Reporting

This activity is related to the obligation regarding reporting the measures taken to implement the provisions of the convention to the conference of parties. This process has two parts, support of the official country reporting to the SC Secretariat and national reporting as a phase of collection of all relevant and required information.

Action 14: Reporting			
AP number	Action Plan	Time	Control
AP14.1	To develop specific reporting mechanism regarding the implementation of the Convention	2022	XII/2022
Responsibility	MoEUCC		
AP14.2	To ensure the national system of collection of all relevant information concerning to the implementation of the	Annually	XII/y

	Turkish NIP measures and annual reporting of the data concerning to emissions, releases, products, wastes, stockpiles and contaminated sites		
Responsibility	MoEUCC		

3.3.15. Research, development and monitoring

According to Article 11 of Stockholm Convention, parties shall conduct appropriate research, development, monitoring and cooperation activities. This activity involves research, development and monitoring actions.

Action 15: Research, development and monitoring			
AP number	Action Plan	Time	Control
AP15.1	To ensure financial support of the priority research and development actions by projects from national funds	2023	XII/2022, XII/2023
Responsibility	MoEUCC in cooperation with MoIT, universities and research institutions		
AP15.2	To include the actions required to implement the Convention in the national research and development programs	2023	XII/2023
Responsibility	MoEUCC in cooperation with MoIT, universities and research institutions		
AP15.3	To develop a comprehensive long term monitoring plan and be a part of global or regional monitoring activities conducted by international organizations, to constitute funding opportunities for researchers/universities to be able to conduct systematic monitoring activities in the	2023	XII/2023

	country		
Responsibility	MoEUCC in cooperation with MoIT, MoAFA, MoH, universities and research institutions		
AP15.4	To ensure targeted pilot and research studies concerning POPs in environmental matrices and technical materials, products, wastes, and human matrices	2023	XII/2023
Responsibility	MoEUCC in cooperation with MoIT, MoAFA, MoH, universities and research institutions		
AP15.5	To develop an inventory system available to collect data on the production, use, import and export of POPs by related users	2022	XII/2022
Responsibility	MoEUCC in cooperation with MoIT, MoAFA, MoH, universities and research institutions		

3.3.16. Technical and financial assistance

In order to fulfill obligations under the Stockholm Convention and CRLTAP/POPs Protocol and for successful implementation of activities and actions to accomplish overall objectives, adequate financial and technical assistance would be required.

Action 16: Technical and financial assistance			
AP number	Action Plan	Time	Control
AP16.1	To ensure a regular annual budget for inventories, disposal, monitoring, research and awareness rising based on the NIP conclusions and measures	Annual	XII/y

Responsibility	MoEUCC		

3.4. Timetable for Implementation and Measures to Take for Success

The activities within the scope of POPs NIP are designed to be implemented in short, medium and long term. The short term activities are the ones to be covered in a period of 3-5 years. These include creating an inventory system and systematic update of inventories by data gathering from related institutions, preparing and implementing legislations, sectoral effect assessment and regulatory effect analysis.

Medium term activities to be performed within 5-7 years consist of assessment of the chemicals to be banned or restricted by the convention, checking inventories for newly listed POPs, identification of contaminated sites, environmentally sound disposal of identified POPs stockpiles, checking industrial facilities for compatibility with BAT/BEP, starting monitoring activities and supporting research activities related to these issues.

Long term activities to be performed within 7-15 years are environmentally sound disposal and elimination of POPs stockpiles and wastes, remediation of contaminated sites, maintaining the monitoring activities, and studies for management of newly listed chemicals.

3.5. Final Statement

For successful implementation of POPs legislation in Turkey, By-law on Persistent Organic Pollutants was prepared by harmonizing Stockholm Convention, CRLTAP/POPs Protocol and EU POPs Regulation, and entered into force on November 14th, 2018 (No. 30595). In this context, several other legislations have also been prepared and published, and some needs further improvements. For effective implementation of the legislations, institutional and organizational framework should be supported by involvement of all stakeholders including ministries, governmental organizations, industrial associations, universities and non-governmental organizations, as well as public. Furthermore, provision of adequate financial and technical assistance would help Turkey to fulfill its obligations under the Stockholm Convention and CLRTAP/POPs Protocol. The policies regarding management of POPs in

Turkey should be included in the development strategies of Turkey and the actions listed in the NIP should be taken into account while determining the development strategies.

Short term activities regarding preparation and regular update of inventories on POPs use, POP wastes and stockpiles, identification of dumpsites and contaminated sites, and improvement of inventories based on related sectors should be carried out for successful fulfillment of obligations of the conventions and for implementation of medium and long term activities. Special attention should be given to the unintentionally produced POPs, regarding their emission inventory and identification of potential sources including relevant industries.

Application of BAT/BEP guidelines for management of POPs emissions, stockpiles and remediation of contaminated sites should be promoted and effective auditing should be performed.

Comprehensive long term POPs monitoring plan should be developed, incorporating the assessment of POPs levels in environmental, technical and human matrices. Necessary auditing for water, soil, air quality, generated wastes, as well as food stuff should be controlled by regulatory actions and funding opportunities should be constituted for national laboratories, research institutions and universities to carry out such studies.

For implementation and management of POPs related problems in Turkey, the control mechanisms and evaluation of the effectiveness of the actions should be clearly defined and established. Especially, assessment of risk associated with exposure of humans to POPs should be prioritized.

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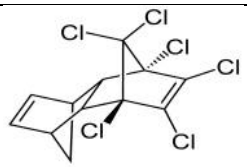
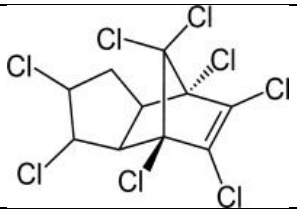
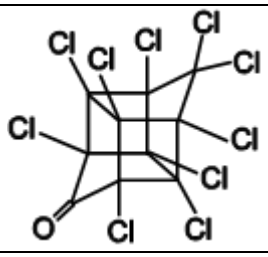
National Implementation Plan of Persistent Organic Pollutants (POPs) Management in Turkey

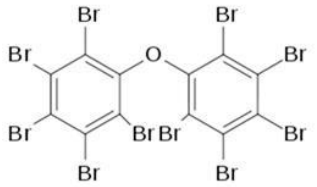
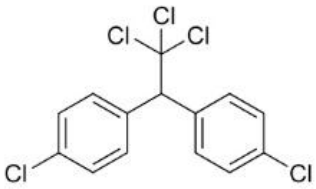
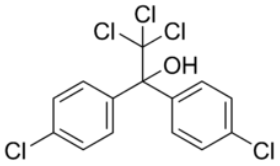
Annexes

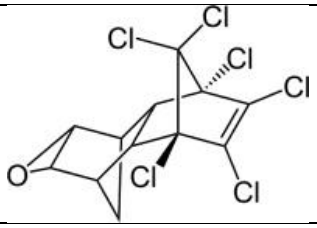
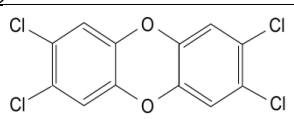
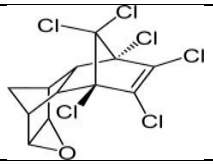
Table of Contents

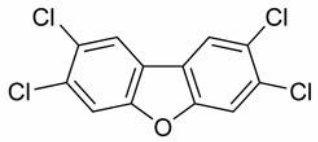
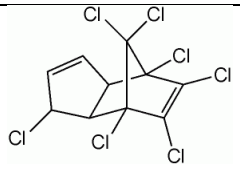
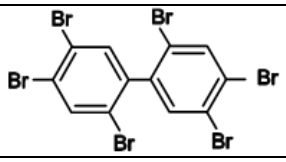
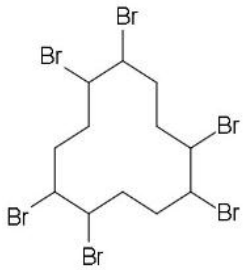
Annex I: Persistent Organic Pollutants

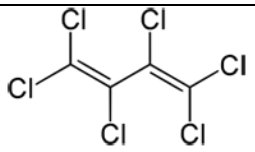
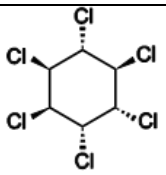
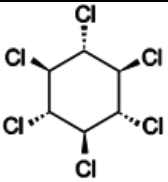
POPs areas of use, CAS numbers and chemical structures are given below:

<table>
<tr><td colspan="3">Aldrin</td></tr>
<tr><td>A pesticide applied to soil for killing termites, crickets, worms, generally for insect control.</td><td>CAS No:
30-9-00-2</td><td>  </td></tr>
<tr><td colspan="3">It can easily be metabolized into dieldrin in plants and animals. As a result, it is very difficult to find aldrin residues in foods and animals, if so in very small quantities. It is bound to the soil particles firmly. Due to its high volatility, it disappears in soil. Because of its persistency and hydrophobic property, aldrin and especially its transformed products become bio-concentrated.
Aldrin is toxic to humans. The lethal dose of aldrin for an adult is estimated as 5 g (83 mg/kg body weight). It was observed that liver and gallbladder cancer rate increased in the professionals who were exposed to aldrin. Only evidence for aldrin causing cancer is based on animal tests. Therefore, IARC (International Agency for Research on Cancer) does not classify aldrin as human carcinogen.</td></tr>
<tr><td colspan="3">Chlordane</td></tr>
<tr><td>An insecticide is widely applied in controlling termites and protecting agricultural products from other insects</td><td>CAS No:57-74-9</td><td>  </td></tr>
<tr><td colspan="3">Chlordane is a wide spectrum contact insecticide. It is semivolatile, so it can be present in the atmosphere. It can be bound to sediments in the water easily and become bioconcentrated in the fat tissues of organisms.
When the chlordane exposed persons were checked up, it has been detected that significant changes had been occurred in their immune system. IARC categorizes chlordane as a possible human carcinogen (2B group: Possible human carcinogen). Average half-life in soil is 1 year.</td></tr>
<tr><td colspan="3">Chlordecone</td></tr>
<tr><td>Chlordecone is a synthetic chlorinated organic compound, which was mainly used as an agricultural pesticide.</td><td>CAS No: 143-50-0</td><td>  </td></tr>
<tr><td colspan="3">Chlordecone is a synthetic chlorinated organic compound, which has mainly been used as an agricultural pesticide. It is closely related chemically to mirex. According to available data, chlordecone can be considered to be highly persistent in the environment. Chlordecone is not expected to hydrolyse or biodegrade in aquatic environments, nor in soil. Direct photodegradation is not significant. Chlordecone does not volatilise to any significant extent. With BCF-values in algae up to 6,000, in invertebrates up to 21,600 and in fish up to 60,200 and documented examples of biomagnification, chlordecone is considered to have a high potential for bioaccumulation and biomagnification.
Concerning the potential for causing adverse effects, there is a convincing set of data. Chlordecone is readily absorbed into the body and accumulates following prolonged exposure. It is both acutely and chronically toxic, producing neurotoxicity, immunotoxicity, reproductive, musculoskeletal and liver toxicity. The International Agency for Research on Cancer has classified chlordecone as a possible human carcinogen (IARC group 2B). Moreover, chlordecone is very toxic to aquatic organisms, most sensitive group being the invertebrates.</td></tr>
</table>

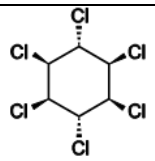
<table>
<tr><td colspan="3">Decabromodiphenyl ether (commercial mixture, c-decaBDE)</td></tr>
<tr><td>DecaBDE is used as an additive flame retardant, and has a variety of applications including in plastics/polymers/composites, textiles, adhesives, sealants, coatings and inks. DecaBDE containing plastics are used in housings of computers and TVs, wires and cables, pipes and carpets.</td><td>CAS No: 1163-19-5</td><td>  </td></tr>
<tr><td colspan="3">The decaBDE is highly persistent, has a high potential for bioaccumulation and food-web biomagnification, as well as for long-range transport. Adverse effects are reported for soil organisms, birds, fish, frog, rat, mice and humans.</td></tr>
<tr><td colspan="3">DDT</td></tr>
<tr><td>Most known POPs type, used during World War 2 to protect soldiers and civillians from malaria, typhoid like diseases spreaded from insects. They are still used in some places to avoid malaria from mosquitos</td><td>CAS No:50-29-3</td><td>  </td></tr>
<tr><td colspan="3">In the post war era DDT use on agricultural products and vector combat continued. Because of the belief of its harmful effects on nature, especially on wild birds, most of the developed countries banned DDT in the beginning of 1970‟s.
Due to its semi-volatile characteristic, it can be present in atmosphere. It can easily accumulate in the fat tissue of all living organisms; it was even detected in mother‟s milk. DDT and its related products are very durable in nature, even after 10 - 15 years from its application more than 50 % of them remain in the soil.
Although there is not enough evidence of DDT being carcinogenic, IARC classified it as a possible human carcinogen based on the results of the animal tests.</td></tr>
<tr><td colspan="3">Dicofol</td></tr>
<tr><td>Dicofol is an organochlorine pesticide comprising two isomers: p,p′-dicofol and o,p′-dicofol. It is an organochlorine miticidal pesticide that has been used in agriculture to control mites on a variety of field crops, fruits, vegetables, ornamentals, cotton, tea. It was also used an acaricide for cotton, citrus and apple crops.</td><td>p,p′-dicofol
CAS No: 115-32-2
o,p′-dicofol
CAS No: 10606-46-9</td><td>  </td></tr>
<tr><td colspan="3">Monitoring data have shown that dicofol is sufficiently persistent to be transported via riverine input to the open sea and to be detected in deep sediment layers dated back several decades. Dicofol has a high bioconcentration potential as demonstrated by experimental derived bioconcentration factor values in fish. Model results showed that dicofol and its metabolites can be transported to remote regions. Limited monitoring evidence of dicofol in environmental media from remote sources is available.
Similar to DDT, dicofol is a toxic concentrated formulation found in the environment and humans with a long persistent and bioaccumulatative property. Prolonged or repeated exposure to dicofol can cause skin irritation, hyperstimulation of nerve transmissions along nerve axons. Dicofol is highly toxic in fish, aquatic invertebrates, algae and in birds is tied to eggshell thinning and reduced fertility.</td></tr>
</table>

Dieldrin		
Used for insects and termites damaging textile plants and also used to control insect related diseases and applied to pests in some farmlands	60-57-1	
Used principally to control insects and textile pests, dieldrin has also been used to control insect-borne diseases and insects living in agricultural soils. Due to its harmful effects on nature and human health, many countries banned dieldrin. It vanishes due to its high volatility in soil. It becomes bio-concentrated because of its persistency and hydrophobic properties Relative increase of liver and gallbladder cancer were observed at workers contacting aldrin, endrin and dieldrin in factories. IARC did not classify dieldrin as a possible human carcinogen as there was no relevant evidence of both human and animal tests. Dieldrin has a half-life of 5 years in warm soil. Dieldrin residues were found in air, soil, fish, bird, mammals, human, and mother's milk		
Dioxins (polychlorinated dibenzo-p-dioxins)		
These chemicals are produced unintentionally due to incomplete combustion, as well during the manufacture of pesticides and other chlorinated substances. They are emitted mostly from the burning of hospital waste, municipal waste, and hazardous waste, and also from automobile emissions, peat, coal, and wood. There are 75 different congeners, of which seven are considered to be of concern. Dioxins have been associated with a number of adverse effects in humans, including immune and enzyme disorders and chloracne, and they are classified as possible human carcinogens.	various	
Among these, PCDDs and PCDFs (also collectively referred to as PCDDs/Fs) have never been used as commercial products, nor were intentionally manufactured for any reason other than laboratory purposes. PCBs, HCB and PeCBz are also unintentionally formed, usually from the same sources that produce PCDDs/Fs. However, unlike PCDDs/Fs, they have also been manufactured and used for specific purposes, their intentional production and use being by far higher than the unintentional formation and release. PCDDs/Fs releases are accompanied by releases of other unintentional POPs, which can be minimized or eliminated by the same measures that are used to address PCDDs/Fs releases. When a comprehensive inventory of PCDDs/Fs is elaborated, it allows to identify priority sources, set measures and develop action plans to minimize releases of all unintentional POPs.		
Endrin		
It is an insecticide sprayed to the leaves of cotton and grain. Used to control rats, microtus and small rodents.	72-20-8	
Endrin is an organochlorine insecticide that used to control rodents such as mice and voles. Animals can metabolize endrin, so it does not accumulate in their fatty tissue to the extent that structurally similar chemicals do. It can reach up to atmosphere because of their volatile character and can be washed away from soil to the surface waters. Statistically a significant raise is seen in liver and gall bladder cancer on the workers of factories		

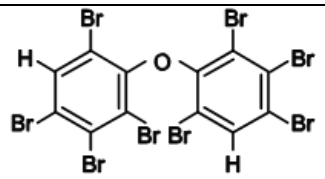
producing aldrin, endrin and dieldrin. IARC didn't classified dieldrin as carcinogen because lack of proof on human kind, and having limited data on experimental animals. Endrin can persist in the soil for up to 12 years and highly toxic to fish.		
Furans (polychlorinated dibenzofurans)		
These substances are produced mostly same as dioxins and produced unintentionally while producing PCB and similarly as dioxins are associated with a number of adverse effects.	Various	
The basic characteristics is presented under Dioxins		
Heptachlor		
Primarily used to kill soil insects and termites, heptachlor has also been used more widely to kill cotton insects, grasshoppers, other crop pests, and malaria-carrying mosquitoes.	CAS No. 72-20-8	
Heptachlor is a non-systemic, effecting through digestive system and by contact. It has a very high volatility, so it can be found in the atmosphere. It can be bound to sediments in the water easily and become bioconcentrated in the fat tissues of living organisms. Heptachlor is metabolized to heptachlor epoxide in animals and this substance can be stored in animal fat tissues. It was determined that gall bladder cancer cases increase significantly in workers of heptachlor producing factories. Although there were no fatal cases for liver and gallbladder cancer, fatal cerebrovascular diseases (brain vessel diseases) were frequently observed. IARC classified Heptachlor as a possible human carcinogen.		
Hexabromobiphenyl		
Hexabromobiphenyl is an industrial chemical that has been used as a flame retardantIt is no longer produced or used.	36355-01-8	
Hexabromobiphenyl (HBB) is a member of polybrominated biphenyls (PBBs) which are generally referred as Brominated Flame Retardants (BFRs) and generally used in 3 groups of products. These are ABS thermoplasticizers generally used in house appliances, sealants and Polyurethane (PUR) foams used in automobile dashboards. Like many countries in the world HBB is not used for a long while since it has been banned for a long time and has many alternatives.		
Hexabromocyclododecane		
Frequently used as brominated flame retardants in materials for insulation (expandable and extruded polystyrene), in polymers of electric and electronic parts, a texitile coating agent	hexabromocyclododecane (CAS number 25637-99-4) and 1,2,5,6,9,10-hexabromocyclododecane (CAS number 3194-55-6)	
HBCD appear as white, non-volatile and odourless solids, insoluble in water but soluble in organic solvents, is very persistent in the environment. Degradation in the environment seems to be insignificant, and levels are mostly increasing. HBCD is for instance still present in sediment after 15-40 years. HBCD is lipophilic and bioaccumulative, the log KOW of 5.6 for HBCD is in the upper range for bioaccumulation, and it is comparable with that of DDT. Biomagnifies and concentrates in natural food chains.		
Hexachlorobenzene		
First introduced in 1945 to treat seeds, HCB kills fungi that affect food crops. It	118-74-1	

was widely used to control wheat bunt. It was produced as industrial chemical and also was/is a byproduct of the manufacture of certain industrial chemicals, combustion processes and exists as an impurity in several pesticide formulations.		
It is highly soluble in fat and can be transferred through breast milk. Low dose of HCB can cause reproductive system malfunction.		
Hexachlorobutadiene		
Hexachlorobutadiene (HCBD) is a halogenated aliphatic hydrocarbon mainly generated as a by-product in the manufacturing of chlorinated hydrocarbons. HCBD has experienced a variety of uses, spanning from an intermediate in chemical production to transformer, hydraulic or heat transfer liquid to a viticulture pesticide. Its use and production have ceased in the UN-ECE countries but information about ongoing application outside the UN-ECE is not currently available. The substance is still unintentionally released by industry, including during waste management.	CAS No: 87-68-3	
Based on the available evidence, HCBD is persistent, bioaccumulative and very toxic to aquatic organisms and toxic to birds. The comparison of effect data with monitoring data of marine sea water, freshwater as well as marine or freshwater sediments, indicates that the risk of significant adverse effects of HCBD to aquatic and sediment dwelling organisms is low but it cannot be excluded. Indeed, the level of uncertainty in identifying long-term risk according to the traditional risk assessment approach cannot be estimated with sufficient accuracy. In addition it should also to be taken into consideration that Arctic animals and top predators are exposed to a mixture of heavy metals and persistent organic substances.		
Alfa-hexachlorocyclohexane		
Alpha-HCH was produced as ballast isomer during the producton of Lindane, many years was use together with other HCH isomers and technical mixture.	319-84-6	
Although the intentional use of alpha-HCH as an insecticide was phased out years ago, this chemical is still produced as unintentional by-product of lindane. For each ton of lindane produced, around 6-10 tons of the other isomers including alpha- and beta-HCH are created. α- HCH is classified as potentially carcinogenic to humans and adversely affects wildlife and human health in contaminated regions.		
Beta-hexachlorocyclohexane		
Although the intentional use of beta-HCH as an insecticide was phased out years ago, this chemical is still produced as unintentional by-product of lindane.	319-85-7	
For each ton of lindane produced, around 6-10 tons of the other isomers including alpha- and beta-		

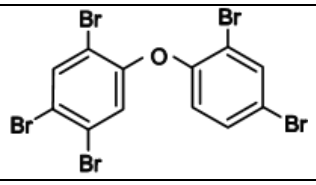
HCH are created. Large stockpiles of alpha- and beta-HCH are therefore present in the environment. Beta-HCH is highly persistent in water in colder regions and may bioaccumulate and biomagnify in biota and arctic food webs. This chemical is subject to long-range transport, is classified as potentially carcinogenic to humans and adversely affects wildlife and human health in contaminated regions.

Lindane		
Lindane has been used as a broad-spectrum insecticide for seed and soil treatment, foliar applications, tree and wood treatment and against ectoparasites in both veterinary and human applications. The production of lindane has decreased rapidly in the last few years and only few countries are still known to produce lindane.	58-89-9	

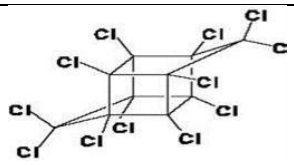
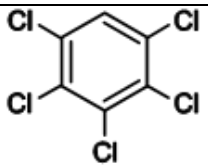
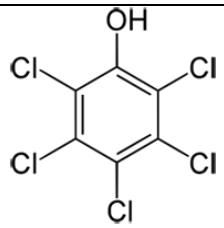
Lindane is effecting through digestive system, respiratory system and by contact. It is in a colourless and crystalline structure. It is mostly used for soil and seed dressing. It is a wide spectrum insecticide used in animal ecoparacites, soil endemic insects, public health diseases, and predators. It is used in various crops (controlled pests: aphids, coleopterous larvas, millepedes, dipteras, lepidopteras, arthropodas and thrips), warehouses, public health applications (roaches, common flies, mosquitos, flies and flea control) and seed applications (it can also be used with fungicides in seed applications). Lindane has a persistent, with high potential to bioconcentration. Their toxic effects are proven on developmental and immune system by the experiments on animals and aquatic organisms.

Commercial octaBDE		
Commercial mixture of octaBDE is mainly used as a flame retardant in electrical and electronic equipment.	CAS No: 68631-49-2 CAS No: 207122-15-4 CAS No: 446255-22-7 CAS No: 207122-16-5	

PBDEs represent one of the sub-groups of brominated flame retardants. PBDEs possess similar characteristics to PCBs1. When PBDEs are incinerated, they have a high risk in formation of polybrominated dibenzo-p-dioxins and dibenzofurans (PBDDs/Fs), having similar effects as PCDDs/Fs.
PBDEs have PBT (persistent, bioaccumulative, toxic) properties and they can be found everywhere in the surrounding environment – in soil, water, sewage, in tissues of fish, birds, seals, whales and polar bears, in human blood, as well as in mother's milk. PBDEs concentrations in the environment are steeply rising.

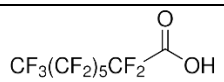
Commercial pentaBDE		
Mainly used as a flame retardant in Polyurethane foams which have many applications in such as automotive sector, furnitures, etc.	CAS No: 5436-43-1 CAS No: 60348-60-9	

The pentabromodiphenylether (PeBDE) commercial product is a mixture of primarily tetra- through hexaBDE congeners (plus trace amounts of triBDE and 0-1% heptaBDE). The ratio of the PBDE-congeners in commercial PeBDE mixtures is different in different regions of the world.
PeBDE is released into the environment during the manufacture of the commercial PeBDE mixture, the manufacture of products, during their use and after they have been discarded as waste. The releases are to air, water and soil. The major part of the releases ends up in soil. The distribution between the environmental compartments is: soil>>>water>air. The main part of PeBDE in the environment is bound to particles; only a small amount is transported in its gaseous phase or diluted in water.
Due to PeBDEs high persistency in air, the main route for long-range transport is through the atmosphere. PeBDE is widespread in the global environment and in humans. Vulnerable ecosystems

<table>
<tr><td colspan="3">and species are affected, among them several endangered species. The potential for the toxic effects in wild life and mammals is evident. The exposure to humans is through food, use of products and indoor air and dust. PeBDE transfers from mothers to embryos and lactating infants. Vulnerable groups can be pregnant women, embryos and infants.</td></tr>
<tr><td colspan="3">Mirex</td></tr>
<tr><td>This insecticide is used mainly to combat fire ants, and it has been used against other types of ants and termites. It has also been used as a fire retardant in plastics, rubber, and electrical goods.</td><td>2385-85-5</td><td>  </td></tr>
<tr><td colspan="3">Mirex is considered to be one of the most stable and persistent pesticides, which half-live in soils of up to 10 years. Mirex is relatively volatile with potential long-range transport. There is evidence of its potential for endocrine disruption and possibly carcinogenic risk to humans.</td></tr>
<tr><td colspan="3">Pentachlorobenzene</td></tr>
<tr><td>PeCB was used in PCB products, in dyestuff carriers, as a fungicide, a flame retardant and as a chemical intermediate e.g. previously for the production of quintozene. PeCB might still be used as an intermediate. PeCB is also produced unintentionally during combustion, thermal and industrial processes. It also present as impurities in products such as solvents or pesticides.</td><td>608-93-5</td><td>  </td></tr>
<tr><td colspan="3">The substance is persistent in the environment and is bioaccumulative. The small spatial variability across the Northern Hemisphere indicates that pentachlorobenzene has a very long atmospheric residence time, which allows it to become widely distributed in the global hemisphere. There are monitoring data from remote areas, backed up by modelling results that suggest that pentachlorobenzene can be transported over great distances. Pentachlorobenzene is moderately toxic to humans, but is very toxic to aquatic organisms. Present concentrations in remote areas are well below estimated critical body burdens.</td></tr>
<tr><td colspan="3">Pentachlorophenol and its salts and esters</td></tr>
<tr><td>It is used as insecticide (termiticide), fungicide, non-selective contact herbicide (defoliant) and, particularly as wood preservative. It is also used in anti-fouling paints and other materials (e.g. textiles, inks, paints, disinfectants and cleaners) as inhibitor of fermentation. Technical PCP contains trace amounts of PCDDs and PCDFs.</td><td>87-86-5 (Pentachlorophenol)
131-52-2 (sodium pentachlorophenate)
27735-64-4 (as monohydrate)
3772-94-9 (pentachlorophenyl laurate)
1825-21-4 (pentachloroanisole)</td><td>  </td></tr>
<tr><td colspan="3">The rate of photodecomposition increases with pH (t1/2 100 hr at pH 3.3 and 3.5 hr at pH 7.3). Complete decomposition in soil suspensions takes >72 days. Although enriched through the food chain, it is rapidly eliminated after discontinuing the exposure (t1/2 = 10- 24 h for fish).
It has been proved to be acutely toxic to aquatic organisms and have certain effects on human health, at the time that exhibits off-flavour effects at very low concentrations. PCP is an aromatic hydrocarbon of the chlorophenol family and was first introduced for use as wood preservative in the 1930's. Since its introduction, PCP has had a variety of other applications (biocide, pesticide, disinfectant, defoliant, anti-sapstain agent, anti-microbial agent and used in the production of pentachlorophenyl laurate). The salt sodium pentachlorophenate (Na-PCP) was used for similar purposes as PCP and readily dissociates to PCP. The ester pentachlorophenyl laurate (PCPL) was used in textiles. PCP is produced by reacting chlorine with phenol at high temperatures in the presence of a catalyst. Contaminants including hexachlorobenzene, dioxins and furans are produced in the manufacturing process.</td></tr>
</table>

Pentachlorobenzene is also suspected to be present. These compounds are inherently toxic, as well as environmentally persistent and their presence may increase the ecological risk associated with the use ofPCP.
PCA is not used as a commercial chemical or pesticide and is not released directly into the environment. It can be produced through the transformation of PCP. PCA may result from the degradation of structurally related chlorinated hydrocarbons, such as PCP, hexachlorobenzene (HCB), lindane (HCH), and pentachlorobenzene (PCNB).

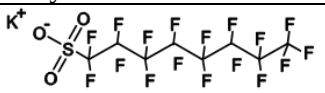
Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds

PFOA, its salts and PFOA-related compounds are used widely in the production of fluoroelastomers and fluoropolymers, for the production of non–stick kitchen ware, food processing equipment. PFOA-related compounds, including side-chain fluorinated polymers, are used as surfactants and surface treatment agents in textiles, paper and paints, firefighting foams. PFOA has been detected in industrial waste, stain resistant carpets, carpet cleaning liquids, house dust, microwave popcorn bags, water, food, and Teflon. Unintentional formation of PFOA is created from inadequate incineration of fluoropolymers from municipal solid waste incineration with inappropriate incineration or open burning facilities at moderate temperatures.	CAS No. 335-67-1	

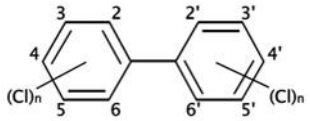
PFOA is highly stable and persistent in the environment with the capacity to undergo long range transport. This is evidenced by monitoring data of PFOA in air, water, soil/sediment and biota in both local and remote locations like the Arctic. PFOA can bioaccumulate and biomagnify in air-breathing mammals and other terrestrial species including humans. PFOA exhibits adverse effects for both terrestrial and aquatic species.

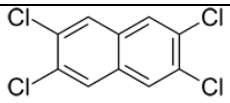
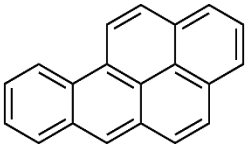
PFOA is identified as a substance of very high concern with a persistent, bioaccumulative and toxic structure for the environment and living organisms. PFOA-related compounds are released into the air, water, soil and solid waste, and degrade to PFOA in the environment and in organisms. Major health issues such as kidney cancer, testicular cancer, thyroid disease, pregnancy-induced hypertension, high cholesterol have been linked to PFOA.

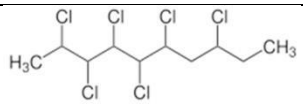
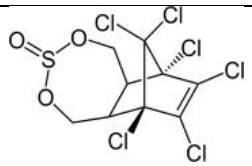
Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride

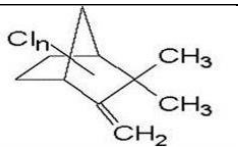
PFOS is both intentionally produced and an unintended degradation product of related anthropogenic chemicals. The current intentional use of PFOS is widespread and includes: electric and electronic parts, firefighting foam, photo imaging, hydraulic fluids and textiles. PFOS is still produced in several countries.	Various	

PFOS is produced synthetically from PFOSF, and PFOS can be derived from its salts when dissolved. The term "PFOS-related substances" is used for all substances that contain one or more PFOS groups (defined as C8F17SO2) and that can, or are assumed to, be degraded to PFOS in the environment. These PFOS-related substances are restricted through the listing of PFOSF, the basic material for their manufacture, and the listing of PFOS in Stockholm Convention.

<table>
<tr><td colspan="3">PFOS and PFOS-related substances are known with their high surface activeness and they have been added to Stockholm Convention Annex B because they meet the POP criteria of the Convention. PFOS and PFOS-related substances have an extensive usage area which is limited by the Convention, permits to intended purposes and special exemptions.</td></tr>
<tr><td colspan="3">Polychlorinated biphenyls</td></tr>
<tr><td>These compounds are used in industry as heat exchange fluids, in electric transformers and capacitors, in hydralulic systems and as additives in paint, carbonless copy paper, and plastics. Of the 209 individual congeners of PCBs, 13 exhibit a dioxin-like toxicity.</td><td>Various</td><td> 
</td></tr>
<tr><td colspan="3">PCBs are the general name given to a group of chlorinated aromatic compounds which are the polychlorinated biphenyls. As, there are 10 places that chlorine atom can occupy in a biphenyl structure, it has 209 different congeners depending on the chlorine atoms situated in PCB structure. As chemical stability and flame retardancy properties and high dielectric constant are high PCBs are mainly and widely used in electrical and electronic equipments, additives in lubricants used in hydraulic machines and other applications for operational safety and maintenance. PCBs are used as dielectric fluid in transformers and capacitors, heat transfer fluid in industries. Moreover, they are also used in carbonless copy paper, insulating materials and plastics.
PCBs are highly dangerous in nature due to its stable structure and persistent properties and are subjected to long range transportation. Also, like other POPs compounds PCBs tend to accumulate in fatty tissues of organisms.
Other than direct production, PCBs may also be produced as a by-product in PVC manufacturing, pesticide production or waste incineration process. Moreover, when the optimum conditions for incineration are not reached, i.e. retarded combustion PCDDs and PCDFs are released.</td></tr>
<tr><td colspan="3">Polychlorinated naphthalenes</td></tr>
<tr><td>Polychlorinated naphthalenes (PCNs) are halogenated organic compounds. PCNs are divided into eight homologue groups, based on the number of chlorine atoms in the molecule. These homologue groups are referred to using the prefixes mono- to octa- (e.g. mono-CNs, di-CNs, etc). Physical-chemical properties vary considerably due to the degree of chlorine substitution. Tri-to octa-CNs are very lipophilic and their water solubility and vapour pressure decrease with the degree of chlorination.</td><td>Various

CAS No: 70776-03-3 (chlorinated naphthalenes)</td><td> 
</td></tr>
<tr><td colspan="3">PCNs had various uses similar to PCBs, which gradually replaced PCNs in many applications. Characteristic functions of PCN formulations were electric insulation, flame retardation and biocidal protection of goods. Until known global production virtually stopped in many countries, having drastically decreased already by the late 1970s, some 150–400 kilotons had been produced worldwide. While the commercial PCN manufacture in the UNECE region has drastically declined since their large-volume production in the first half of the 20th century, the major current source of PCNs is probably waste incineration. Releases from former uses of PCNs or as impurities of technical PCB contained in landfills or old appliances are plausible but difficult to assess.</td></tr>
<tr><td colspan="3">Polycyclic aromatic hydrocarbons</td></tr>
<tr><td>PAHs are a group of compounds consisting of two or more fused aromatic rings. Most of these are formed during incomplete combustion of organic material and the composition of PAHs</td><td>Various</td><td>  </td></tr>
</table>

mixture varies with the source(s) and also due to selective weathering effects in the environment. Some of them are produced.		
Persistence of the PAHs varies with their molecular weight. The low molecular weight PAHs are most easily degraded. The reported half-lives of naphthalene, anthracene and benzo(e)pyrene in sediment are 9.43 and 83 hours, respectively, whereas for higher molecular weight PAHs, their half-lives are up to several years in soils/sediments. The BCFs in aquatic organisms frequently range between 100 – 2 000 and it increases with increasing molecular size. Due to their wide distribution, the environmental pollution by PAHs has aroused global concern. The acute toxicity of low PAHs is moderate, whereas the higher PAHs exhibit higher toxicity. The critical effect of many PAHs in mammals is their carcinogenic potential. The metabolic action of these substances produces intermediates that bind covalently with cellular DNA. IARC has classified benz[*a*]anthracene, benzo[*a*]pyrene, and dibenzo[*ah*]anthracene as probable carcinogenic to humans. Benzo[*b*]fluoranthene and indeno-[123-*cd*]pyrene were classified as possible carcinogens to humans.		
Short-chain chlorinated paraffins		
Polychlorinated alkanes (CxH(2x-y+2)Cly), in the case of SCCPs alkanes with C10-13. They are manufactured by chlorination of liquid n-alkanes or paraffin wax and contain from 30 to 70% chlorine. The products are often divided in three groups depending on chain length: short chain (C10 – C13), medium (C14 – C17) and long (C18 – C30) chain lengths**.**	85535-84-8	
The largest application of CPs is as a plasticizer, where only MCCPs are used generally in conjunction with primary plasticizers such as certain phthalates in flexible PVC. The chlorinated paraffins also impart a number of technical benefits, of which the most significant is the enhancement of flame retardant properties and extreme pressure lubrication. CPs may be released into the environment from improperly disposed metal-working fluids or polymers containing chlorinated paraffins. Loss of chlorinated paraffins by leaching from paints and coatings may also contribute to environmental contamination. Short chain CPs with less than 50 % chlorine content seem to be degraded under aerobic conditions. CPs are bioaccumulated and both uptake and elimination are faster for the substances with low chlorine content. The acute toxicity of CPs in mammals is low with reported oral LD50 values ranging from 4 - 50 g kg-1 bw, although in repeated dose experiments, effects on the liver have been seen at doses of 10 – 100 mg kg^{-1} $bw.day^{-1}$. Short-chain and mid-chain grades have been shown, in laboratory tests, to show toxic effects on fish and other forms of aquatic life after long-term exposure. The NOEC identified in the EU risk assessment for the most sensitive aquatic species tested was 5 μg l^{-1}		
Technical endosulfan and its related isomers		
Widely used to control insects as an insecticide. It was being used since 2009 on grains, fruits, vegetables, forest products and in greenhouses until it is banned.	959-98-8 33213-65-9	
According to the risk profile on endosulfan is persistent in the atmosphere, sediments and water. Endosulfan bioaccumulates and has the potential for long-range transport. It has been detected in air, sediments, water and in living organisms in remote areas, such as the Arctic, that are areas where endosulfan never been used. Endosulfan is toxic to humans and has been shown to have adverse effects on a wide range of aquatic and terrestrial organisms. Exposure to endosulfan has been linked to congenital physical disorders, mental retardations and deaths in farm workers and villagers in developing countries in Africa, Asia and Latin America. Endosulfan sulfate shows toxicity similar to that of endosulfan.		

<table>
<tr><td colspan="3">Toxaphene</td></tr>
<tr><td>This insecticide a non-systemic and contact effective insecticide, used on cotton, cereal grains, fruits, nuts, and vegetables. It has also been used to control ticks and mites in livestock.</td><td>8001-35-2</td><td>  </td></tr>
<tr><td colspan="3">It becomes bioconcentrated in aquatic organisms. It can be carried through the atmosphere.
High frequency chromosome aberration was observed on eight female workers, who had been working on a Toxaphene applied field with 2 kg ha-1 dosage compared with control group. IARC classified Toxaphene as possible human carcinogen.
Its half-life in soil can vary from 100 days to 12 years depending on the soil type and climate.</td></tr>
</table>

Annex II: Country Profile

Governmental and Executive structure

Turkey is integrated to the western world by being a member of European Council, NATO, OECD, AGIT AND G-20. Turkey is a privileged member of European Economic Community since 1963 and a member of Customs Union since 1995; started negotiating to be a full member of European Union. Also Turkey developed cultural, politic, economic and industrial contacts by joining Turkish Council, Turkish Culture and Art Collective Administration, Islam Collaboration Organization and Economic Collaboration Organization

Demography

Population is 83 154 997 by year 2019. Latest census show that the 92.8% of the population lives in provinces and counties. 23 province has a population over 1 million and 20 province has a population between 500 000 and 1 million. Only 3 provinces' population is under 100 000. Most populated 5 provinces of Turkey are Istanbul (15.5 million), Ankara (5.6 million), Izmir (4 million), Bursa (3 million) and Antalya (2.5 million).

There are significant differences between geological regions in population and population density. Physical factors (climate properties, geographical formations, soil characteristics) and human factors (industrialization, agriculture, underground resources, tourism, transportation) effects cause these differences. Maximum population rate is at Marmara Region and the minimum ratio is at East Anatolian Region. Approximate lifetime for men is 76 and 81 for women.

Economy

Turkey placed 13th in gross domestic product (purchasing power parity) and 19th in gross domestic product (nominal). Important sectors of Turkey are banking, construction, major appliances, electronics, textile, petroleum refining, petrochemical products, food, mining, iron-steel, machine industry, tourism and automotive.

Geography

Turkey is located in 36 and 42 degrees Northern Latitudes and 26-45 Eastern Longitudes and shaped like a rectangle. There is a 75 minutes of time difference between east and west sides and it is 1 600 km wide. It has a 783 562 km² projection area and it has the 37th biggest projection area in the world. It is surrounded by three seas; Aegean Sea on west, Black Sea in north and Mediterranean in south. It has Marmara Sea at northeast side.

Turkey is a Eurasian country which has lands on two continents. 97. 5% of its land located in Asia, named Anatolia. The remaining 3% is located in Europe and it is called as East Thrace or Rumelia side. Dardanelles and Bosphorus separate European and Asian lands and links Black Sea and Aegean with Marmara Sea. Bozcaada and Gokceada, are two islands of many that Turkey have in Aegean.

Turkey has its Bulgarian and Greek borders at East Thrace. Neighboring Georgia at northeast; Armenia, Azerbaijan and Iran at east, Iraq and Syria at southeast. Average elevation of the country is 1 132 meters. North Anatolian Mountains lined up in north and Taurus Mountains lined up at south, southeast and east sides of Turkey. The elevation level mostly increases from west to east therefore; the highest elevation level is at the east side of Turkey. The

Mountain Ararat within the boundaries of Agri is the highest mountain of the country. The biggest natural lake is Lake Van. The rivers Fırat, Dicle, Aras and Kura rise from Turkey but flow through borders to other countries. Biggest river rising from Turkey and flows to our borders is Kızılırmak.

Turkey is separated to seven geographical regions. These regions are Mediterranean, East Anatolia, Aegean, Southeastern Anatolia, Central Anatolia, Black sea and Marmara regions. Black Sea region lies up through North Anatolia and one-sixth of the total surface area.

Turkey is placed on several fault lines and has several dormant volcanos. Many earthquakes occurred in history which are 1939 Erzincan Earthquake, 1943 Tosya-ladik Earthquake, 1999 Golcuk Earthquake causing loss of many lives.

Climate

Three climate types could be observed in Turkey. In Aegean and Mediterranean shores has the Mediterranean climate characterized by hot and dry in summer, warm and rainy in winter. In Black Sea shores, Black Sea climate, which has a temperate climate and is rainy in every season, are observed. Natural vegetation is forest. Black Sea shores are the only region which is rainy during all year in Turkey and receives 2 000 - 2 500 mm rain per year.

In Marmara shores located between Aegean and Black Sea, transition climate could be observed. Mediterranean climate is observed in South Shores, Black Sea climate in North Shores and Continental Climate is observed in northwest of Marmara Sea. Snowfall could only be seen a few days in Marmara and Black Sea regions and it only lasts for a few days. Mountains are parallel to the shores and prevent the temperate weather to reach to the middle.

Continental Climate is observed in Central Anatolia, Southeast Anatolia and East Anatolia. In the continental climate temperature differences during day and night is high; hot and dry in summer, cold and snowy during winter. Severe weather conditions could be observed in Eastern sides of Turkey. In East Anatolia temperatures can decrease down to -30°C and -40°C (−22 °F to −40 °F) and snow is present at least 120 days in a year. Average temperature in west is 1°C (34 °F). However, it is hot and dry in summer. All across the country usually the dryest months are July and August as the temperature can get over 30 °C (86 °F) during the day, and the rainiest month is May.

Annex III: Legal Framework on POPs

There are numerous national legislations regarding management of chemicals and wastes, production of pesticides, control of import of products. These legislative instruments are described below (with their date and number of the Official Gazette in which regulation was published) and provisions of the Stockholm Convention are presented in Table AIII/1.

- ***Environmental Law (11.08.1983/2872), Council of Ministers (MoEU);*** aims to establish a legal framework on protecting the environment, preventing environment from pollution, rehabilitation of the environment from any former pollution, improving the environmental status, using the natural resources and energy efficiently, reduction of the waste amount at the source generated as a result of an activity and recovery of the waste generated via using environmentally sound technologies, regulating and taking measures to sustain the good status of the environment to reserve its integrity for the next generations. Article 2 of the law defines hazardous waste and Article 13 of the Law sets the procedures and principles regarding the identification, production, import, use, quantifying, labeling, packaging, classification, storage, risk assessment, transportation and exportation of hazardous chemicals.
- ***Law on the Approval of Ratification of the Stockholm Convention (30.07.2009, 5871), Council of Ministers (MoEU);*** on Persistent Organic Pollutants states that the ratification of Stockholm Convention by Turkey was approved.
- ***Law on the Approval of Ratification of the Basel Convention (30.12.1993, 3957), Council of Ministers (MoEU);*** on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal states that the ratification of Basel Convention by Turkey was approved.
- ***Law on the Approval of Ratification of the Rotterdam Convention (03.04.2017, 6988), Council of Ministers (MoEU);*** on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade states that the ratification of Rotterdam Convention by Turkey was approved.
- ***Law on Veterinary Services, Plant Health, Food and Feed (13.06.2010, 5996), Council of Ministers (MoEU);*** sets the principles of production, import, use, packaging, labeling, transport, storage, certified or non-certified sale, certification, control and supply of pesticides including POPs and provides the legal basis for the relevant by-laws.
- ***By-law on Persistent Organic Pollutants (14.11.2018, 30595), MoEU*** sets the principles of;
    - implementing and enforcing the provisions of Stockholm Convention,
    - prohibiting the production, placing on the market and use of POPs,
    - restricting and gradually eliminating POPs,

  - reducing of POPs releases,
  - managing the wastes containing POPs.
- ***Draft By-law on Export and Import of Some Hazardous Chemicals (to be published in 2020), MoEU*** will implement and enforce the provisions of Rotterdam Convention and set the principles of Prior Informed Procedure in international trade of chemicals including POPs.
- ***By-law on Registration, Evaluation, Authorization and Restriction of Chemicals (23.06.2017, 30105), MoEU*** sets the principles of;
  - gathering and presenting data on production and import of chemicals and controlling of the associated risk caused by chemicals,
  - managing and controlling classification, packaging and labeling of hazardous substances on the market,
  - compilation and distribution of material safety data sheets,
  - restriction and prohibition the production, use and placing on the market of several industrial substances.
- ***By-law on Control of Polychlorinated Biphenyl (PCB) and Polychlorinated Terphenyl (PCT) (27.12.2007, 26739), MoEU*** sets methods and principles of disposal of PCB containing equipment and prohibits the production and import of PCBs.
- ***By-law on Waste Management (02.04.2015, 29314), MoEU*** sets the general principles for management of dangerous wastes including POPs.
- ***By-law on Control of Waste Oils (30.06.2008, 26952), MoEU*** is limiting the amount of PCB in the waste oil, prevention of flaming of these oils and disposal of the oil in an environmentally sound manner.
- ***By-Law on Control of Waste Electrical and Electronic Equipment (22.05.2012, 28300), MoEU*** sets the methods and the principles of disposal of the waste electric and electronic equipment containing POPs and bans the use of several POPs in electric and electronic articles.
- ***By-law on Landfilling of Wastes (26.0.2010, 27533), MoEU*** regulates the landfilling of POPs containing waste.
- ***By-law on the Incineration of Wastes (06.10.2010, 27721), MoEU*** regulates the basic principles of incineration of hazardous waste containing POPs.
- ***By-law on Control of Pollution Caused by Dangerous Substances in Aquatic Environment (26.11.2005, 26005), MoEU*** sets the principles on determination of

water pollution caused directly by POPs or POPs contaminated waste and their reduction.

- ***By-law on Control of Soil Pollution and Sites Contaminated by Point Sources (08.06.2010, 27605), MoEU*** sets the basic principles and the methodologies to determine the possibly contaminated or contaminated sites, cleaning methodologies and monitoring of the sites in a sustainable manner.
- ***By-law on Control of Air Pollution Arising from Industrial Facilities (03.07.2009, 27277), MoEU*** determines the emission limits of unintentional produced POPs (u-POPs) from various industrial applications along with other control of other air pollutants.
- ***By-law on the Prevention and Reduction of the Effects of Major Industrial Accidents (02.03.2019, 30702), MoEU*** sets methods and principles concerning the necessary measures to ensure the efficient and continual prevention of the major industrial accidents in the facilities in which u-POPs can be formed as by-products of processes.
- ***By-law on Licensing and Placing on the Market of Plant Protection Products (PPPs) (09.11.2017, 30235), MoAFA*** covers the licensing of PPPs including POPs pesticides, the establishment of essays for licensing and the introduction of PPPs to the market.
- ***By-law on Controlling the Plant Protection Products (06.07.2011, 27939), MoAFA*** covers the procedures and principles regarding the banning/restricting, quality control, packaging, labeling, promotional banner, brochure, internet publication control of the PPPs including POPs licensed by the Ministry, and the application of the samples taken for the purpose of tests and control and the results of the analyzes to be performed.
- ***By-law on Wholesale, Retail Selling and Storage of Plant Protection Products (PPPs) (13.02.2019, 30685), MoAFA*** sets the principles of safe storing of PPPs including POPs.
- ***By-law on the Import of Plant Protection Products and Their Raw Materials (14.12.2018, 30625), MoAFA*** sets the principles of issuing and auditing the import permits of licensed PPPs including POPs and their raw materials.
- ***By-law on Biocidal Products (BPs) (31.12.2009, 27449), MoH*** sets the principles of production, import and placing on the market of BPs including POPs.

- ***By-law of Transportation of Dangerous Goods by Road (24.04.2019, 30754), MoTI*** sets the principles of transport of dangerous goods (including hazardous chemical substances like POPs) by public roads; conducting in a safe, secure and orderly manner without harming human health and other living assets and the environment in accordance with The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR, ECE/TRANS/275).
- ***Communiqué on Auditing of Import of Chemicals that are Controlled for Environmental Protection (27.12.2019, 30991), MoT*** regulates the import of hazardous chemicals including POPs that are banned or restricted by relevant institutions. The communiqué is annually updated.
- ***Communiqué on Auditing of Import of Plant Protection Products that are Controlled by the Ministry of Agriculture and Forestry Affairs (27.12.2019, 30991), MoT*** regulates the import of pesticides including POPs that are banned or restricted by the Ministry of Agriculture and Forestry Affairs. The communiqué is annually updated.

Table AIII/1. Turkish Legislations in accordance with Stockholm Convention's Legal Liabilities

Article	No	Requirement		Responsible Institution	Fulfillment	Related Legislation
3	**1.a**	Prohibit and/or take the legal and administrative measures necessary to eliminate	**i.** production and use of the chemicals listed in Annex A	MoEU (industrial chemicals)	Prohibited Annex A chemicals in industrial category are as follows; - Aldrin, - Alpha Hexachlorocyclohexane, - Beta Hexachlorocyclohexane, - Chlordane, - Chlordecone, - Dieldrin, - Endosulfan, - Endrin, - Heptachlor, - Hexabromobiphenyl, - Hexachlorobenzene, - Hexachlorobutadiene, - Hexabromocyclododecane, - Lindane, - Mirex, - PCBs, - Pentachlorobenzene, - Pentachlorophenol and its salts and esters, - Technical Endosulfan and its related isomers, - Polychlorinated naphthalenes, - Toxaphene.	By-law on By-law on Persistent Organic Pollutants By-law on Control of Waste Electrical and Electronic Equipment
				MoH (industrial chemicals)	Prohibition of the production of electrical and electronic equipment containing and PBDEs (with some exceptions) Prohibition of the production of PCBs Prohibition of the use of α-HCH in cosmetic products	By-law on Control of PCBs and PCTs By-law on Cosmetics
				MoAFA (pesticides)	According to the relevant legislation, production, manufacturing, marketing (including import) and use of unregistered plant protection products within the territory of the country are prohibited. Prohibited POPs in pesticide category are as follows; - Aldrin, - Alpha hexachlorocyclohexane, - Beta hexachlorocyclohexane, - Chlordane, - Chlordecone, - Dieldrin, - Endrin, - Heptachlor, - Hexachlorobenzene, - Lindane, - Mirex, - Pentachlorobenzene. - Pentachlorophenol and its salts and esters, - Technical Endosulfan and its related isomers, - Toxaphene.	By-law on Licensing and Placing on the Market of Plant Protection Products By-law on Wholesale, Retail Selling and Storage of Plant Protection Products By-law on Controlling the Plant Protection Products

Table AIII/1. Turkish Legislations in accordance with Stockholm Convention's Legal Liabilities

Article	No	Requirement		Responsible Institution	Fulfillment	Related Legislation
			ii. import and export of the chemicals listed in Annex A	MoEU (industrial chemicals)	Imports of following Annex A Chemicals are prohibited: - Aldrin, - Alpha Hexachlorocyclohexane, - Beta Hexachlorocyclohexane, - Chlordane, - Chlordecone, - Dieldrin, - Endosulfan, - Endrin, - Heptachlor, - Hexabromobiphenyl, - Hexachlorobenzene, - Hexachlorobutadiene, - Hexabromocyclododecane, - Lindane, - Mirex, - PCBs, - Pentachlorobenzene, - Pentachlorophenol and its salts and esters, - Technical Endosulfan and its related isomers, - Polychlorinated naphthalenes, - Toxaphene.	By-law on By-law on Persistent Organic Pollutants
				MoEU (industrial chemicals)		By-law on Control of PCBs and PCTs
				MoEU (industrial chemicals)		By-law on Waste Management
				MoEU (hazardous wastes)	Prohibition of the import of PCBs	
					Prohibition of the import and export of hazardous wastes containing POPs	By-law on Control of Waste Electrical and Electronic
				MoT (industrial chemicals)	Prohibition of the import of electrical and electronic equipments containing hexabromobiphenyl and PBDEs in (with some exceptions)	equipment
				MoEU (industrial chemicals)	The Communiqué is a secondary legislation regulating the legislative procedures for Customs controls while importing hazardous chemicals.	Communiqué on Auditing of Import of Chemicals that are Controlled for Environmental Protection
					Prohibition of export of Annex A chemicals will be regulated by a Draft by-law which will be come into force in 2020.	Draft By-Law on Import and Export of Some Hazardous Chemicals
					According to the relevant legislation, imports of unregistered plant protection products within the territory of the country are prohibited. Prohibited POPs in pesticide category are	By-law on Licensing and Placing on the Market of Plant Protection Products

Table AIII/1. Turkish Legislations in accordance with Stockholm Convention's Legal Liabilities

Article	No	Requirement		Responsible Institution	Fulfillment	Related Legislation
					as follows; - Aldrin, - Alpha hexachlorocyclohexane, - Beta hexachlorocyclohexane, - Chlordane, - Chlordecone, - Dieldrin, - Endrin, - Heptachlor, - Hexachlorobenzene, - Lindane, - Mirex, - Pentachlorobenzene. - Pentachlorophenol and its salts and esters, - Technical Endosulfan and its related isomers, - Toxaphene. There is a special application for export of hazardous pesticides. Exporters planning to export of prohibited pesticides, they must inform and take permission to export from the National Authority of Importing country and the Ministry of Agriculture and Forestry Affairs simultaneously. The Communiqué is a secondary legislation regulating the legislative procedures for Customs controls while importing plant protection products.	By-law on Wholesale, Retail Selling and Storage of Plant Protection Products By-law on Controlling the Plant Protection Products Communiqué on Auditing of Import of Plant Protection Products that are Controlled by the Ministry of Agriculture and Forestry Affairs
				MoAFA (pesticides) MoT (industrial chemicals)		
3	**1.b**	Restrict the production and use of the chemicals listed in Annex B		MoEU	Restricted Annex B chemicals in industrial category are as follows; - PFOS. Production and use of DDT in industrial category are prohibited	By-law on By-law on Persistent Organic Pollutants
				MoAFA	Banned (hence restricted) Annex B chemicals in pesticide category are as follows; - DDT, - PFOS.	By-law on Licensing and Placing on the Market of Plant Protection Products By-law on Controlling the Plant Protection Products
3	**2.a**	Take the necessary measures to ensure that a chemical listed in Annex A or Annex B is imported only	i. for the purpose of environmentally sound disposal	MoEU	Imports of hazardous wastes are prohibited (covering wastes which includes Annex A or B chemicals) Prohibition of the import of PCBs	By-law on Waste Management By-law on Control of PCBs and PCTs
			ii. for a use or purpose which is permitted for that Party under Annex A or Annex B	MoEU		By-law on By-law on Persistent Organic Pollutants

Table AIII/1. Turkish Legislations in accordance with Stockholm Convention's Legal Liabilities

Article	No	Requirement		Responsible Institution	Fulfillment	Related Legislation
				MoAFA	There is no special exemption for acceptable purposes on POPs containing industrial chemicals and pesticides.	By-law on Licensing and Placing on the Market of Plant Protection Products By-law on Controlling the Plant Protection Products
3	**2.b**	Take measures to ensure that a chemical listed in Annex A or B for which production or use specific exemptions and/or acceptable purpose are in effect is exported only	i. for the purpose of environmentally sound disposal	MoEU MoAFA	Prohibition of export of Annex A or B chemicals will be regulated by a Draft by-law which will be come into force in 2020.	Draft By-Law on Import and Export of Some Hazardous Chemicals
			ii. to a party which is permitted to use that chemical	MoEU	Ensuring that the wastes containing POPs are export only for the purpose of environmentally soundly disposal	By-law on Control of Wastes
			iii. to a nonparty state by ensuring the environmental protection			
3	**2.c**	Take measures to ensure that a chemical listed in Annex A for which production or use specific exemptions are no longer in effect for any party is not exported from it except for the purpose of environmentally soundly disposal		MoEU MoAFA	Ensuring that the wastes containing POPs are export only for the purpose of environmentally soundly disposal There is a special application for export of hazardous pesticides. Exporters planning to export of prohibited pesticides, they must inform and take permission to export from the National Authority of Importing country and the Ministry of Agriculture and Forestry Affairs simultaneously.	By-law on Control of Wastes By-law on Controlling the Plant Protection Products
3	**3&4**	Take measures to regulate the production and use of new industrial chemicals/pesticides which exhibit the characteristics of persistent organic pollutants		MoEU MoAFA	Once a new POPs chemical included to the annexes of the Stockholm Convention, then the Ministry of Environment and Urbanization starts the process of taking measures. The production of new pesticides is controlled.	By-law on By-law on Persistent Organic Pollutants By-law on Licensing and Placing on the Market of Plant Protection Products
5	**a**	Develop an action plan to identify, characterize and address the release of Annex C chemicals including;	**i.** evaluation of the current and projected releases; source inventory and release estimates	MoEU	Emission limits of unintentional produced POPs (PCDD, PCDF and PCB only) from various industrial applications were determined. Measures to ensure the efficient and continual prevention of the major industrial accidents in the facilities in which u-POPs can be formed as by-products of processes were taken.	By-law on Control of Air Pollution Arising from Industrial Facilities By-law on the Prevention and Reduction of the Effects of Major
			ii. evaluation of the effectiveness of the existing legislation			

Table AIII/1. Turkish Legislations in accordance with Stockholm Convention's Legal Liabilities

Article	No	Requirement		Responsible Institution	Fulfillment	Related Legislation
			iii. strategies to meet the obligations of the Convention			Industrial Accidents
			iv. awareness raising activities			
			v. periodic review of the activities			
			vi. a schedule for the implementation of the action plan			
5	**b**	Promote the application of available, feasible and practical measures to reduce the releases		MoEU	The Ministry promotes available, feasible and practical measures (including Best Available Techniques) to reduce the releases of u-POPs listed in Annex-C of the SC.	By-law on By-law on Persistent Organic Pollutants
5	**c**	Promote the development and use of substitute materials to prevent the formation of Annex C chemicals		MoEU	While the Ministry is considering recommendations to build new industrial facilities or to significantly change existing facilities using processes that release the chemicals listed in Annex-C of the SC, alternative processes, techniques that have similar uses but prevent the formation or release of substances listed in Annex-C. The Ministry prepares guidelines on measures that prevent or minimize the formation or release of substances listed in Annex-C of the SC.	By-law on By-law on Persistent Organic Pollutants
5	**d, e**	Promote the use of best available techniques and best environmental practices to control and eliminate the production and releases of Annex C chemicals		MoEU	The Ministry promotes the Best Available Techniques to reduce the releases of u-POPs listed in Annex-C of the SC.	By-law on By-law on Persistent Organic Pollutants
6	**1.a**	Develop appropriate strategies for identifying	**i.** stockpiles containing Annex A/B chemicals	MoEU	In case there is a stockpile that contains any POPs substance that is not allowed to be used, the owner of the stockpile manages this stockpile as hazardous waste and takes the necessary precautions to protect human health and the environment.	By-law on By-law on Persistent Organic Pollutants
			ii. products and articles in use and wastes containing Annex A/B/C chemicals	MoEU	There are reduction calendars for each POPs chemicals, products, articles in use and wastes containing POPs chemicals.	By-law on By-law on Persistent Organic Pollutants
6	**1.b**	Identification of the stockpiles of Annex A/B chemicals		MoEU	Most of the old stockpiles have been identified.	By-law on By-law on Persistent Organic Pollutants
6	**1.c**	Manage stockpiles in an environmentally soundly manner		MoEU	Most of the old stockpiles have been disposed in environmentally soundly manner according to the international standards.	By-law on By-law on Persistent Organic Pollutants
6	**1.d**	Take measures to ensure that POPs containing wastes are	**i.** handled, collected, transported and stored in an environmentally soundly manner	MoEU	MoEU sets the general principles for management of dangerous wastes including POPs. MoEU limited the amount of PCB (only	By-law on Waste Management By-law on Control of Waste

Table AIII/1. Turkish Legislations in accordance with Stockholm Convention's Legal Liabilities

Article	No	Requirement		Responsible Institution	Fulfillment	Related Legislation
			ii. disposed appropriately or environmentally soundly considering the international regulations on hazardous waste management		which is one of the POPs chemicals) in the waste oil, prevention of flaming oils and disposal of the oil in an environmentally sound manner.	Oils
			iii. not permitted to be disposed of in such a way that can be resulted in the recovery, reuse, recycling and reclamation of the POPs		MoEU set the methods and the principles of disposal of the waste electric and electronic equipment containing POPs and bans the use of several POPs in electric and electronic articles. The related POPs chemicals are PBB, PCB and PBDE.	By-law on Control of Waste Electrical and Electronic Equipment
			iv. not transported across international boundaries without considering the international rules and regulations		MoEU is regulating the landfilling of hazardous wastes containing POPs.	By-law on Landfilling of Wastes
					MoEU is regulating the basic principles of incineration of hazardous waste containing POPs and it also sets emission limits of unintentional produced POPs (PCDD and PCDF).	By-law on the Incineration of Wastes
					The hazardous wastes including POPs chemicals are not transported across international boundaries without considering the international rules and regulations related to Basel Convention (as Turkey is a party to the convention).	By-law on Waste Management
6	**1.e**	Endeavour to develop appropriate strategies to identify the contaminated sites		MoEU	MoEU set the basic principles and the methodologies to determine the possibly contaminated or contaminated sites, cleaning methodologies and monitoring of the sites in a sustainable manner. In this scope, Contaminated Sites Information System was established.	By-law on Control of Soil Pollution and Sites Contaminated by Point Sources
7	**1**	Develop and update a review a national implementation plan in line with the provisions of the Convention		MoEU	First and second national implementation plans have been submitted to the secretariat in 2011 and 2016 respectively.	By-law on By-law on Persistent Organic Pollutants
7	**3**	Integrate national implementation plans in sustainable development strategies		MoEU	-	-
9	**1**	Undertake information exchange on reduction/elimination of the production, use and release of POPs and alternatives of POPs		MoEU	The Ministry and related institutions with the help of other countries and international organizations are engaging information exchange activities regarding to minimize, eliminate and determine the persistent organic pollutants and their alternatives, risks associated with these alternatives and economic and social costs.	By-law on By-law on Persistent Organic Pollutants
10	**1**	Enhance the awareness of public and decision makers on POPs issue		MoEU	Regarding persistent organic pollutants, the Ministry and the related institution encourage and facilitate; a) Reducing the health and environmental impacts, alternatives, manufacturing, uses and emissions of persistent organic pollutants, especially for policy makers, decision-makers and vulnerable groups (groups that require special	By-law on By-law on Persistent Organic Pollutants

Table AIII/1. Turkish Legislations in accordance with Stockholm Convention's Legal Liabilities

Article	No	Requirement	Responsible Institution	Fulfillment	Related Legislation
				policy, such as young, old, disabled, pregnant or breastfeeding workers and female workers), b) Implementing awareness programs related to elimination, c) Providing information to the public, d) Training including employees, scientists, educators and technical and administrative staff.	
10	**5**	Develop mechanisms to collect information on estimates of annual quantities of POPs like pollutant release and transfer registers	MoEU	-	-
11	**1**	Encourage research, development and monitoring activities on POPs	All relevant governmental institutions	Also the only monitoring procedure described in the Turkish By-law on POPs is for u-POPs. Although they are not specific to POPs, Turkish Scientific and Technical Research Council provides support to research activities.	-
15	**1**	Report to the Conference of Parties on the measures taken to implement the Convention and the effectiveness of these measures	All relevant governmental institutions	The relevant institution transmits information about the implementation of the SC to the Ministry every three years, including information on violations and penalties. The relevant institutions, manufacturers and importers provide statistical data to the Ministry each year regarding the total production and placing on the market of any POPs substances. Every three years, the relevant institution provides the Ministry with the following information; a) Information compiled from notifications regarding inventories, b) Information compiled from prepared release inventories, c) Information compiled from prepared u-POPs inventories. Regarding to the information compiled above, the Ministry prepares a report at the intervals to be determined by the Conference of the Parties on the basis of the information provided under the inventory and transmits it to the Secretariat.	By-law on By-law on Persistent Organic Pollutants
15	**2**	Provide statistical data to the secretariat on the production, import, export of POPs	MoEU	Whenever it is requested by the Secretariat, the Ministry provides statistical data to the secretariat on the production, import, export of POPs.	By-law on By-law on Persistent Organic Pollutants
16	**2**	Conduct monitoring studies to obtain meaningful data for evaluating the effectiveness of the Convention	All relevant governmental institutions	Whenever it is requested by the Secretariat, the Ministry conducts monitoring studies.	By-law on By-law on Persistent Organic Pollutants

Annex IV: National POPs Inventory

Table AIV/1: Import and export amounts for pentachlorophenol and its salts and esters (TURKSTAT, 2020)

HS codes	Name of the Chemicals	Activity	Year (kg)			Residual
			2017	2018	2019	
2908.11	Pentachlorophenol	**import**	1	3	1	+5
		export			-	
2908.19	Pentachloropenol salts and esters	**import**	-	-	-	-
		export	-	-	-	
					Total	+5

Table AIV/2. c-PentaBDE inventoried in the transport sector of Turkey for 2012-2019 (the fifth column is the difference between 3rd and 4th column)

in kg	POP-PBDEs in vehicles currently in use in inventory year (2018) (kg)*	POP-PBDEs imported in vehicles only in the inventory year (2019) (kg)**	POP-PBDEs in end-of-life vehicles generated between 2012-2019 (kg)***	POP-PBDEs recycled from transport sector between 2012-2019 (kg)****	POP-PBDEs disposed of from the transport sector between 2012-2019 (kg)****
Inventoried c-PentaBDE	92,919.2	1.3	9,183.3	4,677.6	4,505.7
tetraBDE	29,734.1	0.4	2,938.7	1,496.8	1,441.8
pentaBDE	52,034.7	0.8	5,142.6	2,619.5	2,523.2
hexaBDE	8,362.7	0.1	826.5	421.0	405.5
heptaBDE	464.6	0.0	45.9	23.4	22.5

** TURKSTAT database for vehicles currently in use*
*** TURKSTAT special trade system foreign trade database*
**** TURKSTAT database for deregistered vehicles*
***** Ministry of Environment and Urbanization ELV recycle data, < 5000 kg ELV, assuming > 5000 kg c-pentaBDE contribution negligible*

Table AIV/3. Estimated c-OctaBDE (kg) and corresponding POP-PBDE content of CRT monitors in Turkey by 2019

	c-OctaBDE	heptaBDE homologue	hexaBDE homologue
0.00087 ton/ton application	92,200	39,700	10,100
0.00254 ton/ton application	269,300	115,800	29,600

Table AIV/4. c-OctaBDE inventoried in CRT monitors in Turkey between 2013-2020 years

	POP-PBDEs Imported in 2019-2020 *	POP-PBDEs in stocks for inventory year of 2020**	POP-PBDEs entering the waste stream in 2020***	POP-PBDEs in recycled polymers for years of 2015-16-17-18****
Number of computers	245	14,136,349.49	1,742,582.493	2,614,432.6
c-OctaBDE (kg)	1.6	92,239.7	11,370.4	17,059.2
hexaBDE (kg)	0.2	10,146.4	1,250.7	1,876.5
heptaBDE (kg)	0.7	39,663.1	4,889.3	7,335.4
octaBDE (kg)	0.6	32,283.9	3,979.6	5,970.7

** TURKSTAT special trade system database, HS codes of 852841, 852842, and 852849*
*** Calculated according to the Guide Document, Asian Regional Constant of 0.17 CRT/capita*
**** Calculated according to the Guide Document, 8 years of lifetime assumption*
***** Calculated using MOTAT KDS, with EU waste codes of 200135, 160213*

Table AIV/5. ABS imports to Turkey by countries and by years (in kg) [2019 and 2020 values are temporary] TURKSTAT data with HS code of 39033000

ABS import	Brazil	Cambodia	Japan	Republic of Korea	Taiwan	Total
2000	200	0	25,754	6,126,821	2,658,003	33,473,837
2001	0	0	17,700	6,099,626	2,212,944	23,296,074
2002	0	0	116,975	8,848,169	1,453,642	32,067,630
2003	0	0	90,075	11,430,075	2,733,675	38,332,118
2004	0	0	157,852	8,712,493	3,589,148	50,688,439
2005	0	0	218,809	7,927,881	2,540,098	53,863,172
2006	0	0	361,740	12,750,081	3,886,600	58,995,903
2007	0	0	177,196	24,743,024	4,703,841	66,284,382
2008	0	0	265,530	25,610,987	3,337,075	63,915,458
2009	0	0	257,713	29,793,366	3,434,912	64,118,882
2010	0	0	413,664	36,285,151	5,212,250	84,432,206
2011	0	0	353,234	45,661,678	6,851,100	87,315,158
2012	0	0	32,974	44,080,972	8,712,500	86,935,555
2013	0	0	99,094	57,080,129	8,222,350	99,393,058
2014	0	0	2,743	60,630,786	5,840,050	98,840,465
2015	0	0	4,100	72,512,659	7,588,274	110,932,682
2016	150	0	8,750	74,956,013	7,474,765	114,086,004
2017	0	0	15,100	79,876,430	10,402,475	132,340,858
2018	0	0	3,600	68,893,510	7,050,100	113,149,087
2019	0	0	20,980	76,010,628	8,761,950	120,254,962
2020	0	0	16,825	46,022,773	4,115,750	73,558,033

Table AIV/6. Estimated octaBDE entry to Turkey via direct import of ABS, assuming 1/3 of them contained octaBDE, TURKSTAT data on special trade system foreign trade database

Year	Estimated octaBDE entry (12 %) in tons	Estimated octaBDE entry (18 %) in tons
2000	1,339.0	2,008.4
2001	931.8	1,397.8
2002	1,282.7	1,924.1
2003	1,533.3	2,299.9
2004	2,027.5	3,041.3
2005	427.5	641.2
2006	679.9	1,019.9
2007	1,185.0	1,777.4
2008	1,168.5	1,752.8
2009	1,339.4	2,009.2
2010	1,676.4	2,514.7
2011	2,114.6	3,172.0
2012	2,113.1	3,169.6
2013	2,616.1	3,924.1
2014	2,658.9	3,988.4
2015	3,204.2	4,806.3
2016	3,297.6	4,946.4
2017	3,611.8	5,417.6
2018	3,037.9	4,556.8

2019	3,391.7	5,087.6
2020	2,006.2	3,009.3
TOTAL	41,643.2	62,464.8

Table AIV/7. TURKSTAT Foreign Trade Statistics Import of Intermediate Goods Data on 382488 HS Code

	Import (kg)
2017	138,380
2018	43,531
2019	48,953
Total	230,864

Table AIV/8. TURKSTAT Foreign Trade Statistics Specific Trade System Data 382488 HS Code

	Import (kg)	Export (kg)	Net (kg)
2017	90,425	19,405	71,020
2018	22,844	139,799	-116,955
2019	237	3,092	-2,855
2020	-	361	-361
Total	113,506	162,657	-49,151

Table AIV/9. Recycled ELV's ASR components and their corresponding estimated DecaBDE content with a constant of 0.625 g/kg (Morf et al. 2003)

	16-01-04 code waste amount kg	Corresponding ASR 25 % kg	DecaBDE content coefficient per kg	DecaBDE content kg
2015	37,180	9,295	0.625 g/kg	5,809
2016	28,280	7,070	0.625 g/kg	4,418

Table AIV/10. Recycled waste stream of the TV and Monitors of CRT, plasma, and LCD types in Turkey and estimated DecaBDE (Sakai et al. 2006)

	20-01-35* kg	16-02-13* kg	20-01-35* units[1]	16-02-13* units[1]	Total estimated DecaBDE t
2015	5,873,993	4,982,427	524,463.7	444,859.6	145.4
2016	14,606,171	6,722,230	1,304,122	600,199.1	285.6
2017	9,519,039	7,582,704	849,914.2	677,027.1	229.0
2018	4,888,355	11,185,897	436,460.3	998,740.8	215.3
Total	34,887,558	30,473,258	3,114,961	2,720,827	875.4

** Calculated using MOTAT KDS*

[1]This is according to Kalmykova et al.'s (2015) study, conservative estimate of 6 kg/ unit LCD and 16.4 kg/ unit CRT, equal average of 11.2 kg/unit.

Table AIV/11. Small household appliances, IT and telecommunication equipment and consumer equipment recycled (and disposal + recycle in parentheses) waste in kg in Turkey with corresponding DecaBDE content

	20-01-35* waste (kg)	DecaBDE content with 0.8 kg/t constant
2015	5,873,993 (5,879,684)	4,699.2
2016	14,606,171 (14,633,514)	11,684.9
2017	9,519,039 (9,534,677)	7,615.2

2018	4,888,355 (4,928,790)	3,910.7
Total	34,887,558	27,910

** Calculated using MOTAT KDS*

Table AIV/12. Number of building & construction material producing enterprises and their volume of productions*.

	Number of Enterprises	Volume of Production (kg)	Volume of sales (kg)	Net (kg)
2012	14	166,679,990	136,317,583	30,362,407
2013	16	214,442,625	193,456,263	20,986,362
2014	20	207,224,453	191,236,835	15,987,618
2015	17	153,828,532	142,740,603	11,087,929
2016	34	192,709,313	190,117,379	2,591,934
2017	34	184,701,070	186,382,615	-1,681,545
2018	35	193,614,560	238,648,336	-45,033,776
Total	35	1,313,200,543	1,278,899,614	34,300,929

** TURKSTAT yearly industrial production database*

Table AIV/13. Velour pile fabrics (13.20.41) and cotton production related to the products (13.20.20.17.00 and 13.20.20.74.00) other than clothing and corresponding predicted DecaBDE amount*

	13.20.41 m2	13.20.20.17.00 m2**	13.20.20.74.00 m2**	DecaBDE t
2005	138,578,990	86,879,453	111,154,038	6,063.6
2006	47,576,676	100,667,470	52,684,851	3,127.5
2007	28,161,048	99,105,265	40,623,124	2,450.9
2008	27,201,509	96,804,326	43,085,083	2,427.7
2009	27,490,522	155,566,234	32,746,244	3,028.4
2010	32,356,634	83,055,798	34,908,888	2,294.4
2011	28,277,586	137,912,391	36,625,995	2,880.4
2012	31,056,838	192,804,878	40,692,178	3,675.6
2013	42,706,306	205,944,060	60,520,363	4,385.2
2014	51,343,614	184,222,507	54,196,463	4,268.4
2015	47,959,273	226,255,234	45,764,544	4,591.2
2016	40,800,201	183,201,700	50,800,681	3,937.5
2017	33,702,770	180,601,584	58,472,313	3,813.4
2018	69,264,374	199,781,791	81,111,618	5,259.1
Total	646,476,341	2,132,802,691	743,386,383	52,203.3

** TURKSTAT yearly industrial production database*
*** Product code for uses other than clothing*

Table AIV/14. Product codes and corresponding definitions of the companies the surveys sent

Product Code	Definition
13.96.14.00.00	Textile fabrics, impregnated, coated or covered n.e.c.
20.16.20.35.00	Expansible polystyrene, in primary forms
20.16.20.39.00	Polystyrene in primary forms, except EPS
20.16.20.50.00	Styrene-acrilonitrile copolymers, primary forms
20.16.20.70.00	Acrylonitrile-butadiene-styrene (ABS) copolymers, in primary forms
20.16.20.90.00	Polymers of styrene, in primary forms (excluding polystyrene, styrene-acrylonitrile (SAN) copolymers, acrylonitrile-butadiene-styrene (ABS) copolymers)
20.16.56.70.00	Polyurethanes, in primary forms
20.30.11.70.03	Paints and varnishes, incl. industry paints, electrostatics paints, polyurethane protective paints and etc., based on electrophoretic, dispersed or dissolved in an aqueous medium
22.21.10.90.00	Monofilament with any cross-sectional dimension > 1 mm; rods; sticks and profile shapes of plastics (excluding of polymers of ethylene, of polymers of vinyl chloride)
22.21.41.50.00	Cellular plates, sheets, film, foil and strip of polyurethanes
22.21.41.80.00	Cellular plates, sheets, film, foil and strip of plastics (excluding of polymers of styrene, of polymers of

	vinyl chloride, of polyurethanes, of rengenerated cellulose)
22.21.42.79.00	Other plates, sheets, films, foil and strip, of polymerization products
22.29.29.90.00	Other articles of plastics or other materials
26.40.34.40.00	Colour video monitors with cathode-ray tube

Table AIV/15. Flame retardants used in Turkey, their chemical base and amount used.

Name	Chemical Basis	Amount used
PES 1090	Non-halogenated, phosphorus based	2,000 tons/year
ADDIFLAM 650	1,2-benzisothiazol-3(2H)-one, antimony trioxide	120,500 kg/year
TCPP	tris (1-chloro-2-propyl) phosphate	78,260 kg/year
Nor 116	triazine derivative	1,500 kg/year
ADDIFLAM PES LW92	phosphonic acid derivative	1,250 kg/year
Orgaflame FR-33 ECO	Water/halogen based, antimony mixed	360 kg/year
RUCO FLAM PSC	Alkyl phosphonate	120 kg/year
POLYOL IXOL M 125	halogenated aliphatic polyether diol	71.986 kg/year
Zinc phosphate	Zinc phosphate	50 kg/year
Aluminum trihydroxide	Aluminum trihydroxide	20 kg/year
Red phosphorus	Red phosphorus	20 kg/year
Ammonium polyphosphate	Ammonium polyphosphate	20 kg/year
Zinc borate	Zinc borate	20 kg/year
Halosite	Halosite	20 kg/year
9-10-dihydro-9-oxa-10-phosphophenantrene-10-oxide	9-10-dihydro-9-oxa-10-phosphophenantrene-10-oxide	20 kg/year
Non-halogenated FR	Without halogen	5 kg/year

Table AIV/16. The market data of Pre-mixed PS imported or produced in Turkey between the period of 2015-2018 (t/year)

Market and HBCD Consumption (t/year.)	**2015**	**2016**	**2017**	**2018**
TOTAL EPS pre-mixed PS product amount	**230,000**	**232,000**	**239,000**	**238,000**
National Production	130,000	138,000	148,000	154,000
HBCD based flame retardant use	792.80	989.00	997.42	823.84
Imported Products	100,000	94,000	91,000	84,000
Import from EU	63,000	60,000	59,000	55,000
Predicted flame retardant use	567	540	531	495
Import from Far East	37,000	34,000	32,000	29,000
Predicted flame retardant use	278	255	240	218
TOTAL FLAME RETARDANT USE	**1,637.30**	**1,784.00**	**1,768.42**	**1,536.34**

Source: EPSDER – EPS Industry Association

Table AIV/17. The summary of the total HBCD consumption of 4 plants which produces pre-mixed polystryene used in the production of EPS

	2018 Production Data (t/year.)			**HBCD based flame retardant production (kg/year)**				
	Capacity	**Production**	**HBCD Production**	**2015**	**2016**	**2017**	**2018**	**2016-2018 average**
TOTAL	**351,500**	**263,328**	**66,573**	**792,800**	**989,005**	**997,420**	**823,841**	**974,590**

Source: Survey data of the participating companies

Table AIV/18. The total HBCD consumption summary of the XPS producers in the period of 2016-2018

2018 Production Data (t/year.)	HBCD based flame retardant production (kg/year)

	Capacity	Production	2016	2017	2018	2016-2018 average
TOTAL	1,814,586	1,244,586	753,694	749,805	604,923	704,706

Source: Survey data of the participating companies

Table AIV/19. Import and export amounts for short chain chlorinated paraffins (kg) (TURKSTAT, 2020)

HS codes	Activity	Year (kg)			Residual (kg)
		2017	2018	2019	
32.08.10.90	import	5,025,380	5,984,454	5,626,605	5,075,458
	export	2,962,235	4,011,331	4,587,415	
32.08.20.90.00.11	import	6,117,105	6,710,687	7,221,572	7,793,679
	export	3,688,284	3,864,478	4,702,923	
32.08.20.90.00.12	import	4,116,218	3,272,351	3,382,982	9,836,935
	export	386,398	209,736	338,482	
27.12.20.10	import	1,097,019	1,329,850	1,897,945	-1,632,124
	export	2,103,590	1,939,054	1,914,294	
38.12.20.90	import	9,561,442	9,593,776	8,566,370	26,830,587
	export	216,523	217,879	456,599	

Table AIV/20. Import and export amounts for polychlorinated naphthalenes (kg) (TURKSTAT, 2020)

HS codes	activity	year			residual
		2017	2018	2019	
29.03.99.80	import	1	6	7	+13
	export	1	-	-	

Table AIV/21. Import and export amounts for PFOA, its salts and PFOA-related compounds (kg) (TURKSTAT, 2020)

HS codes	Activity	Year (kg)			Residual (kg)
		2017	2018	2019	
29.03.78.00	**import**	-	-	-	-850
	export	850	-	-	
38.09.92.00.10.00	**import**	139,870	320,075	136,761	355,365
	export	116,540	115,780	9,021	
38.09.92.00.90.00	**import**	6,667,535	6,013,233	6,458,589	16,069,741
	export	818,837	1,346,705	904,074	
38.09.93.00.10.00	**import**	1,060,484	1,134,134	1,279,145	1,353,063
	export	688,281	753,971	678,448	
38.09.93.00.90.00	**import**	3,642,470	3,312,367	4,198,525	7,767,487
	export	1,122,913	971,479	1,291,483	
34.03.11.00	**import**	4,618,366	4,313,280	4,154,704	10,296,403
	export	1,143,136	740,841	905,970	

34.03.19.10.00	**import**	701,601	727,291	803,916	1,642,869
	export	160,086	177,587	252,266	
34.03.99	**import**	12,706,320	12,938,890	12,099,670	32,871,947
	export	1,804	2,261,462	2,609,667	
32.08.10.90.00	**import**	2,945,054	2,561,628	1,180,352	6,325,299
	export	50,153	140,014	171,568	
32.08.20.90.00.11	**import**	6,117,105	6,710,687	7,221,572	7,793,679
	export	3,688,284	3,864,478	4,702,923	
38.11.29.00.90.00	**import**	133,586	167,670	292,646	384,917
	export	83,118	87,646	38,221	
32.15.11.10	**import**	95,383	-	-	15,060
	export	80,323	-	-	
32.15.11.90.00	**import**	2,610,802	-	-	-843,628
	export	3,454,430	-	-	
35.06.99.00.90.19	**import**	4,433,533	2,777,873	4,044,035	-22,443,158
	export	14,009,403	9,719,518	9,969,678	
38.22.00.90	**import**	-	13,223,940	13,374,353	24,620,794
	export	-	704,868	1,272,631	
				TOTAL	86,208,988

National Environment Agency, 2019

Table AIV/22. The amount of PFOS used in the country by taking the difference between the import and export amounts for three years 17-18-19 (TURKSTAT)

HS codes	**Name of the Chemicals**	**Activity**	**Year (kg)**			**Residual (kg)**
			2017	**2018**	**2019**	
2904.31	Perfluorooctane sulfonic acid	**import**	-	2	-	+ 2
		export	-	-	-	
2904.34	Potassium perfluorooctane sulfonate	**import**	50	-	-	- 50
		export	-	100	-	
2904.33	Lithium perfluorooctane sulfonate	**import**	-	-	-	- 125
		export	-	125	-	
2904.32	Ammonium perfluorooctane sulfonate	**import**	-	75	-	+ 75
		export	-	-	-	
2922.16	Diethanolammonium perfluorooctane sulfonate	**import**	784	-	-	+ 784
		export	-	-	-	
2923.30	Tetraethylammonium perfluorooctane sulfonate	**import**	250	-	26	+ 276
		export	-	-	-	
2923.40	Didecyldimethylammonium perfluorooctane sulfonate	**import**	20	20	-	+ 40
		export	-	-	-	
2935.10	N-Methylperfluorooctane sulfonamide	**import**	6	1	2	+ 9
		Export	-	-	-	
2935.30	N-Ethyl-N-(2-hydroxyethyl)	**import**	1	-	-	+ 1

	perfluorooctane sulfonamide	**export**	-	-	-	
2935.40	N-(2-Hydroxyethyl)-Nmethylperfluorooctane sulfonamide	**import**	1	-	2	+ 3
		export	-	-	-	
2904.36	Perfluorooctane sulfonyl fluoride	**import**	-	-	-	- 2000
		export	-	2000	-	
					Total	- 985

Table AIV/23. Import and export amounts of specific HS codes for 2017-2019 for PFOS-related substances

HS codes	**Name**	**Activity**	**Year (kg)**			**Residual (kg)**
			2017	**2018**	**2019**	
2710 19 83 0000	Hydraulic oils	import	29,081,598	27,517,007	14,959,010	18,902,900
		export	15,257,680	18,268,818	19,128,217	
3808 91 20 0019	Insecticides	import	945	4,593	45,973	-165,887
		export	86,493	63,809	67,096	
3808 91 90 0019	Insecticides	import	3,845,353	4,825,320	4,806,458	-12,444,935
		export	1,068,204	11,845,665	13,008,197	
3813 00 00 0017	Materials and compositions for fire extinguishers; firefighting bombs of all kinds	import	3,117,710	3,116,367	2,453,660	6,093,343
		export	510,312	1,125,689	958,393	
8424 10 00 0000	Fire extinguishers	import	1,266,299	2,042,495	983,136	-977,830
		export	1,804,491	1,546,156	1,919,113	
3824 87 00 00 00	Containing perfluorooctane sulfonic acid, its salts, perfluorooctane sulfonamides or perfluorooctane sulphonyl fluoride	import	19,245	-	-	19,118
		export	127	-	-	

Table AIV/24. Priority Sectors Production, Import and Export Amounts

Sector	Production Amount (kg)			Import Amount (kg)			Export Amount (kg)			Amount Remaining (kg)		
	2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
Metal Plating	*	*	*	*	*	*	*	*	*	*	*	*
Textile[1]	3,458,823,529	3,489,705,882	3,520,588,235	2,285,296,226	2,059,304,230	2,113,696,832	1,192,212,151	1,253,906,009	1,191,357,248	4,551,907,604	4,295,104,103	4,442,927,819
Apparel[1]	3,373,939,394	3,403,535,354	3,551,515,152	39,384,271	32,234,761	29,813,306	385,278,452	397,934,144	417,170,837	3,028,045,212	3,037,835,971	3,164,157,620
Synthetic Carpet[2]	967,651,621	1,003,606,998	1,116,883,833	2,279,692	1,993,617	1,906,470	580,590,972	602,164,199	670,130,300	389,340,340	403,436,417	448,660,004
Paper-Cardboard[3]	13,513,514	11,666,667	*	2,533,596,368	2,610,161,093	*	462,454,457	280,275,429	*	2,084,655,424	2,341,552,331	*
Aviation Hydraulic Fluids[4]	*	*	*	65,424,189	62,601,681	58,324,743	134,798,699	147,574,862	167,063,528	*	*	*

[1]İHKİB Sectoral Reports on import and export, [2]Ministry of Trade, General Directorate of Export, Sectoral Report on Carpet, [3] Paper-Cardboard Manufacturing Industry Sectoral Report, [4]Import and Export amount predicted from HS Codes; 2710.19.81.00.00 (engine oils, compressor and turbine oils), 2710.19.83.00.00 (hydraulic oils), 3819.00.00.00.00 (petroleum oils for hydraulic brake fluids and hydraulic transmissions)

Table AIV/25. Approximate PFOS Amount for Priority Sectors

SECTORS	Remaining Product amount in country (kg)			PFOS amount per product (low-high) mg PFOS kg-1 product)[1]	Approximte PFOS amounts remaining in country (tonne PFOS)						
						2017		2018		2019	
	2017	2018	2019		Scenario[2]	Low Value	High Value	Low Value	High Value	Low Value	High Value
Textile	4,551,907,604	4,295,104,103	4,442,927,819	500-5000	**0.001%**	0.023	0.228	0.021	0.215	0.022	0.222
					0.01%	0.228	2.276	0.215	2.148	0.222	2.221
					0.1%	2.276	22.760	2.148	21.476	2.221	22.215
					1%	22.760	227.595	21.476	214.755	22.215	222.146
					10%	227.595	2275.954	214.755	2147.552	222.146	2221.464
Apparel	3,028,045,212	3,037,835,971	3,164,157,620	500-5000	**0.001%**	0.015	0.151	0.015	0.152	0.016	0.158
					0.01%	0.151	1.514	0.152	1.519	0.158	1.582
					0.1%	1.514	15.140	1.519	15.189	1.582	15.821
					1%	15.140	151.402	15.189	151.892	15.821	158.208
					10%	151.402	1514.023	151.892	1518.918	158.208	1582.079

Synthetic Carpet	389,340,340	403,436,417	448,660,004	500-5000	**0.001%**	0.002	0.019	0.002	0.020	0.002	0.022
					0.01%	0.019	0.195	0.020	0.202	0.022	0.224
					0.1%	0.195	1.947	0.202	2.017	0.224	2.243
					1%	1.947	19.467	2.017	20.172	2.243	22.433
					10%	19.467	194.670	20.172	201.718	22.433	224.330
Paper-Cardboard	2,084,655,424	2,341,552,331	*	500-5000	**0.001%**	0.010	0.104	0.012	0.117	*	*
					0.01%	0.104	1.042	0.117	1.171	*	*
					0.1%	1.042	10.423	1.171	11.708	*	*
					1%	10.423	104.233	11.708	117.078	*	*
					10%	104.233	1042.328	117.078	1170.776	*	*
				TOTAL	***0.001%***	*0.052*	*0.503*	*0.050*	*0.504*	*0.040*	*0.403*
					0.01%	*0.522*	*5.027*	*0.504*	*5.039*	*0.403*	*4.028*
					0.1%	*5.222*	*50.270*	*5.039*	*50.390*	*4.028*	*40.279*
					1%	*52.216*	*502.697*	*50.390*	*503.896*	*40.279*	*402.787*
					10%	*522.164*	*5026.974*	*503.896*	*5038.964*	*402.787*	*4027.873*

[1]Stockholm Convention PFOS Inventory Guideline, [2]It is not applicable to predict PFOS amount of the Products. The Scenario shows possible amount of PFOS .

Table AIV/26. 2019 uPOPs inventory of Turkey

Group	Source Groups	Annual Releases (g TEQ/a)				
		Air	Water	Land	Product	Residue
1	Waste Incineration	0.1	0.0	0.0	0.0	3.0
2	Ferrous and Non-Ferrous Metal Production	48.1	0.3	0.0	0.0	186.2
3	Heat and Power Generation	44.0	0.0	0.0	0.0	26.0
4	Production of Mineral Products	4.0	0.0	0.0	0.1	2.9
5	Transportation	3.4	0.0	0.0	0.0	0.0
6	Open Burning Processes	66.6	0.0	65.1	0.0	0.0
7	Production of Chemicals and Consumer Goods	0.1	7.4	0.0	87.2	11.4
8	Miscellaneous	0.0	0.0	0.0	0.0	0.0
9	Disposal	0.0	87.5	0.0	7.1	195.6
10	Identification of Potential Hot-Spots				0.0	0.0
1-10	**Total**	**166.4**	**95.2**	**65.1**	**94.4**	**425.1**
	Grand Total			**846**		

Table AIV/27. 2014 uPOPs inventory of Turkey

Group	Source Groups	Annual Releases (g TEQ/a)				
		Air	Water	Land	Product	Residue
1	Waste Incineration	0.2	0.0	0.0	0.0	7.0
2	Ferrous and Non-Ferrous Metal Production	156.2	0.1	0.0	0.0	567.4
3	Heat and Power Generation	60.5	0.0	0.0	0.0	31.2
4	Production of Mineral Products	11.2	0.0	0.0	0.2	2.7
5	Transportation	2.6	0.0	0.0	0.0	0.0
6	Open Burning Processes	78.4	0.0	76.8	0.0	0.0
7	Production of Chemicals and Consumer Goods	0.3	7.5	0.0	87.4	15.3
8	Miscellaneous	0.0	0.0	0.0	0.0	0.1
9	Disposal	0.0	6.1	0.0	1.6	193.2
10	Identification of Potential Hot-Spots				0.0	0.0
1-10	**Total**	**309.2**	**13.7**	**76.8**	**89.2**	**816.9**
	Grand Total			**1306**		

Table AIV/28. 2010 uPOPs inventory of Turkey

Group	Source Groups	Annual Releases (g TEQ/a)				
		Air	Water	Land	Product	Residue
1	Waste Incineration	62.8	0	0	0	1.3
2	Ferrous and Non-Ferrous Metal Production	624.7	0	0	0	675.4
3	Heat and Power Generation	59	0	0	0	13
4	Production of Mineral Products	10	0	0	0.3	0.1
5	Transportation	21.5	0	0	0	0

6	Open Burning Processes	151	0	96	0	0
7	Production of Chemicals and Consumer Goods	0	5.3	0	72.5	23.3
8	Miscellaneous	0	0	0	0	0.1
9	Disposal	0	6.5	0	2.2	180
10	Identification of Potential Hot-Spots	0	0	0	0	0
1-10	**Total**	**929**	**11.8**	**96**	**75**	**893.2**
	Grand Total	**2005**				

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Annex V: Current Programs and Results on Monitoring of POPs Emissions and Effects on Human Health and Environment

The First Long Term Monitoring Study in Turkey

Under the global passive air monitoring network (MONET) project, background sampling station was located in Çamkoru, Ankara, Turkey. Atmospheric levels of POPs have been identified since 2009 and contaminant levels ranged 0.5-2.1 ng/sample for 7 indicator PCBs, 494-4072 ng/sample for 29 PAHs, 0.02-3.1 ng/sample for 10 PBDEs and 0.7-3.2 ng/sample for DDTs. The data is freely available at https://data.genasis.cz/outdoor/.

Levels of POPs in various biotic and abiotic matrices identified by academic studies

The updated information regarding the POPs levels identified in various biotic and abiotic matrices in Turkey are provided in Tables AV/1-4.

Table AV/1: Concentrations of pesticides in various matrices in Turkey

Medium	Location	Site	Year	Compound	Concentration	Ref.
Air	Antalya	agricultural rural	2013	endosulfan	0.610-64.5 pg/m3	[1]
				total DDT	bdl-25.9 pg/m3	
				heptachlor	bdl-7.38 pg/m3	
				chlordane	bdl-0.828 pg/m3	
				total HCH	bdl-2.55 pg/m3	
Sediment	Edremit Bay		2015	pp-DDE	nd-1.2 ng/g dw	[2]
Soil	Meriç-Ergene river basin	industrial and agricultural		total OCP	6-83 ng/g	[3]
Lichen					7-86 ng/g	
Pine needle					10-97 ng/g	
Pine needles & branches	Bursa	Suburban	2016	10 OCPs	10+3.8 ng/g	[4]
Pine needle	Mersin	mountain	2009-2010	HCH	1.4-129 pg/g fw	[5]
				DDT	67.3-795.8 pg/g fw	
Butter	Gaziantep		2015	HCH	2.39-7.22 ng/g fat	[6]
				DDT	5.07-32.1 ng/g fat	
				OCP	2.39-35.1 ng/g fat	
	Mardin			HCH	4.18-25.12 ng/g fat	
				DDT	4.52-660.4 ng/g fat	
				OCP	4.52-675.93 ng/g fat	
	Şanlıurfa			HCH	5.99-22.5 ng/gfat	
				DDT	18.5-750 ng/g fat	
				OCP	29.5-770 ng/g fat	
Raw cow milk	Konya		-	total HCH	11.23-127.19 ng/g lipid wt	[7]
				total DDT	1.99-81.53 ng/g lipid wt	
				heptachlor	<4-20.38 ng/g lipid wt	
				endosulfan	1.83-44.82 ng/g lipid wt	
				endrin	4.48-155.15 ng/g lipid wt	
				aldrin	0.26-8.4 ng/g lipid	

					wt	
				dieldrin	0.56-13.29 ng/g lipid wt	
UHT milk	several cities			total HCH	23.33-141.66 ng/g lipid wt	
				total DDT	6.67-20 ng/g lipid wt	
				heptachlor	4.36-33.87 ng/g lipid wt	
				endosulfan	7.2-36.67 ng/g lipid wt	
				endrin	8.06-63.33 ng/g lipid wt	
				aldrin	0.97-10 ng/g lipid wt	
				dieldrin	1.67-20 ng/g lipid wt	

Table AV/2: Concentrations of PCBs in various matrices in Turkey

Medium	Location	Site	Year	Concentration	no.of PCBs	Reference
Air	Kocaeli	industrial	2015-2016	177-41781 pg/m3	41	[8]
Air	throughout Turkey		2014-2015	108+132 pg/m3	43	[9]
Air	Bursa	Suburban	2016	50-250 pg/m3	79	[4]
Outdoor air	Bursa	urban	2014	19-510 pg/m3	40	[10]
Indoor air				140-960 pg/m3		
Air	Antalya	agricultural rural	2013	nd-213 pg/m3	15	[1]
Soil	Kocaeli	industrial	2015-2016	0.83-239 ng/g	41	[11]
Soil	Bursa	Rural	2016	5.82-18.71 ng/g	43	[12]
Pine needles & branches	Bursa	Suburban	2016	2-10.9 ng/g	81	[4]
Soil	Meriç-Ergene river basin	industrial and agricultural	-	10-63 ng/g	15	[3]
Lichen				7-68 ng/g	15	
Pine needle				11-33 ng/g	15	
Honey	Bursa	urban-semi-urban	2017	71.57-178.36 ng/g dw	46	[13]
Honeybee				93.31-166.91 ng/g		
Pollen				47.8-112.86 ng/g		
Raw cow milk	Konya			10.59-35.91 ng/g lipid wt	7	[7]
UHT milk	several cities			21.63-101.32	7	
Fish	İzmir		2010-2013	ND-34.3ng/g	7	[14]
Butter	Gaziantep		2015	26.24-257.63 ng/g fat	9	[6]
	Mardin			5.15-341.5 ng/g fat		
	Şanlıurfa			7.58-104.6 ng/g fat		

Table AV/3: Concentrations of PBDEs in various matrices in Turkey

Medium	Location	Site	Year	Concentration	no.of PBDEs	Reference
Air	throughout Turkey		2014-2015	191+329 pg/m3	14	[9]
Car dust	Bursa		2018	<MDL-40198 ng/g	13	[15]
Raw cow milk	Konya		-	bdl-20.22 ng/g lipid wt	5	[7]
UHT milk	several cities			bdl-20 ng/g lipid wt	5	

Table AV/4: Concentrations of PAHs in various matrices in Turkey

Medium	Location	Site	Year	Concentration	No. of PAHs	Reference
Soil	Kocaeli	industrial	2015-2016	49-10512 ng/g	15	[11]
Ambient air	İnegöl		2017-2018	113.12-3122.97 ng/m3	16	[16]
Air	Bursa	urban& semi-urban	2017	1.08-16.54 ng/m3	16	[17]
Sediment	Edremit bay		2015	0.65-175 ng/g	18	[2]
Soil	İstanbul	Urban & rural	2013-2014	22.11+14.71 ng/m3 (urban) 19.53+16.45 ng/m3 (rural)	16	[18]
Pine needle	Bursa		2016	626+306 ng/g	14	[4]
Air	Bursa	suburban	2016	23.1+18.3 ng/m3	14	
Air	Bursa	semi-rural	2013-2014	6-798 ng/m3	15	[19]
Soil	Meriç-Ergene river basin	industrial and agricultural	-	67-887 ng/g	16	[3]
Lichen				75-1278 ng/g	16	
Pine needle				113-589 ng/g	16	
Air	Kocaeli	industrial	2015-2016	4.2-3842 ng/m3	15	[8]

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